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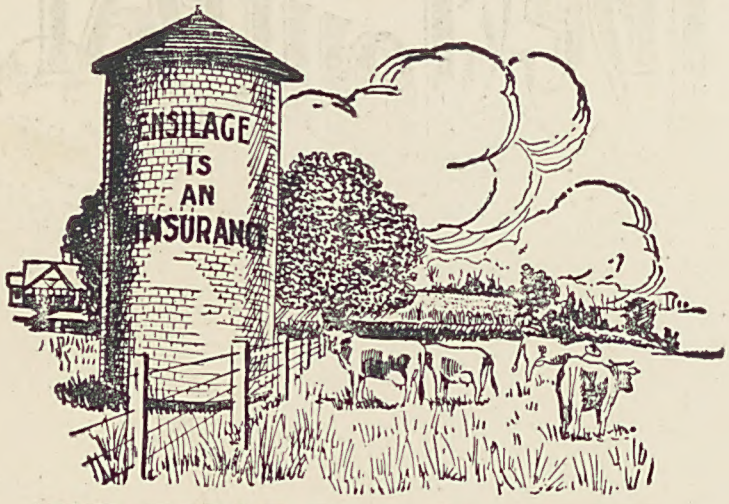

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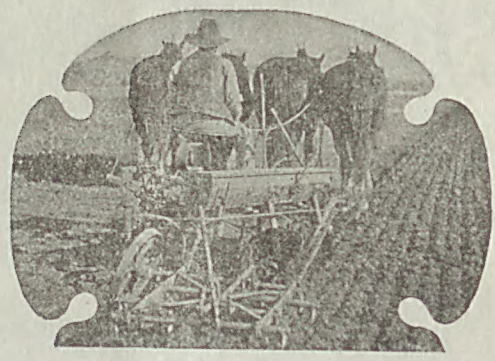

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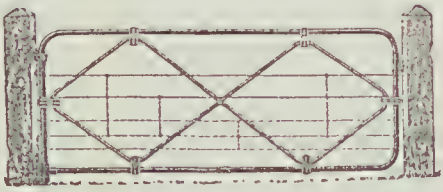

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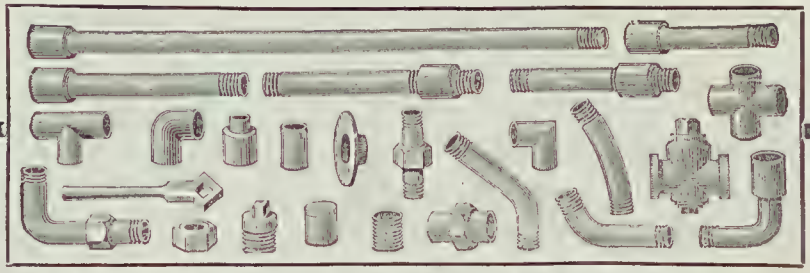

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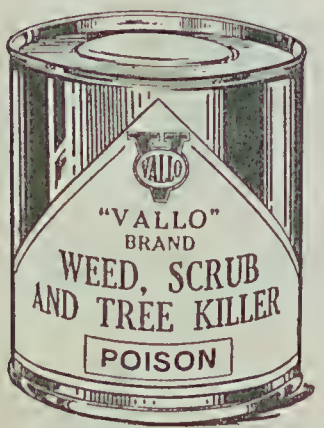

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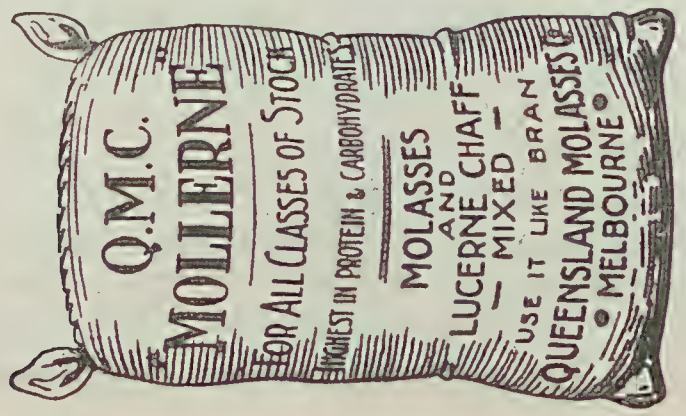

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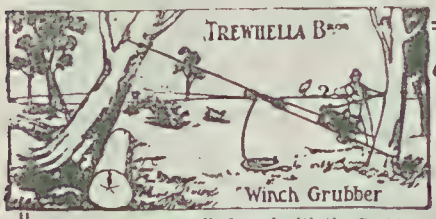

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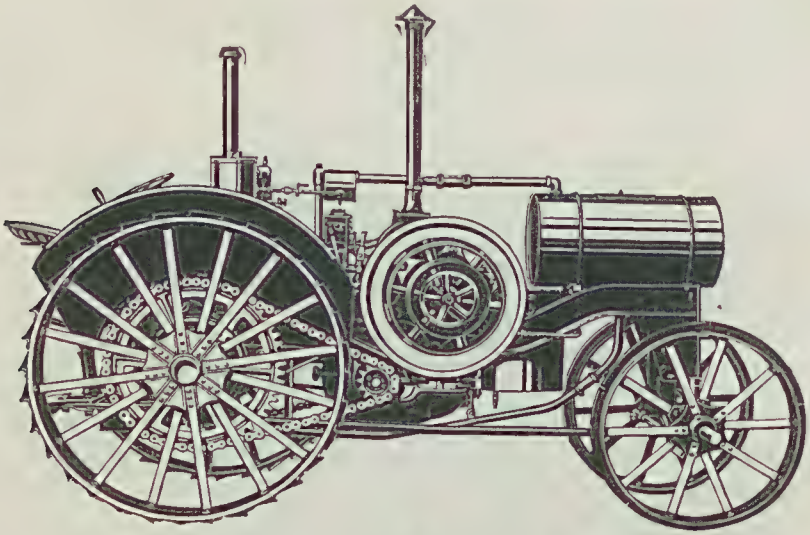

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CROP AND FALLOW COMPETITION, NHILL, 1919.

Report of the Judge, H. A. Mullett, B.Ag.Sc., Chief Field Officer, Department of Agriculture.

I have much pleasure in forwarding herewith my report as judge of the Crop and Fallow Competitions for 1919, recently held by your society.

Except for a break of one year during the 1914 drought, this competition has been held annually for twenty successive years, and it now ranks as one of the established agricultural institutions of the State. The benefits that have been conferred by it locally are widely recognised, and the view is generally accepted that such competitions are most valuable in encouraging the spread of the best farming practices.

Following upon the publication in the report for 1917 of the history of the Nhill competitions, together with a review of what had been accomplished there, agricultural societies in other progressive districts have taken the matter up. This year contests have been completed at Ouyen, Minyip, Dimboola, Rupanyup, and Goroke, while the Royal Agricultural Society has offered prizes totalling £100 for the champion farm of the Wimmera. This movement is, I believe, the expression of a new and healthy desire among members of the farming community to seek and adopt the best farming methods, as well as the highest mode of living compatable with country life. If properly fostered and extended it should be one of the most potent factors for the advancement of agriculture that this State has known.

At Nhill the competition has developed much further than a mere contest for a prize. It takes the form of an annual public investigation on the spot into the methods by which the best crops of the year in the district have been grown. It even goes further than that. Prior to the war, in one section of the competition the whole of the farm—home, garden, buildings and their arrangement, subdivision, fencing, water supply, plant and implements, horses, sheep, and cattle were judged as well. The effect has been most noteworthy, and to-day

on the average there is no district in the wheat belt where the farms are so well improved or better managed than at Nhill.

The Season.

It is a matter for congratulation that the extremely dry conditions this season did not deter the society from adhering to its usual programme, because it is in a year like the present that the methods of the best men are thrown into strong relief.

Mr. James Moulden's Comfortable Farm Home at Kiata.

Mr. M. M. McKenzie's Mallee Home and Garden, Glenlee.

The rainfall experienced in the district was not only exceptionally light, but very patchy; for instance, near the town (normal rainfall 17 inches), 11½ inches were recorded; at Salisbury there were 8½ inches, while at Lorquon only 7¾ inches fell.

The Kaniva and Lawloit districts were on the whole more fortunate. At Messrs. Crouch Brothers' farm, a few miles out, 12½ inches of rain were registered.

The uneven distribution of this rain has to a certain extent interfered with the sureness with which useful deductions can be made from a consideration of the methods by which the various crops were grown. But this much is certain, that the best crops, as always, are those which were able to utilize the maximum of moisture—whether it chanced to fall as extra rain or was deliberately conserved in the fallow for the crop by the energy and skill of the farmer.

On the average about 3½ inches of rain this year fell in February and March, *i.e.*, outside the growing period of the crop; this left but 4½ inches of effective rain at Lorquon, and 9 inches at Kaniva, Salisbury being intermediate with 6½ to 7¾ inches.

There was a time in the history of the Wimmera—farmers readily admit it—when a rainfall of this meagre character would have meant a complete harvest failure, but to-day at Kaniva there are those who will reap between ten and eleven bags to the acre over fairly large areas. At Kiata East a ten-bag crop was seen, while throughout the district there were numbers of crops which should average between eight and nine bags. Even at Lorquon some five-bag crops were harvested. These are crops that many districts in the wheat belt are proud of in a normal year. How are they grown? The answer is by careful attention to each is one of the known factors for success. Chief among these is the careful working of the fallows after rain. On the black land every such working is worth at least a bushel of wheat.

This year during the summer there were workings that were literally worth bags of wheat to the acre. If there is one thing that was demonstrated conclusively, it was the marked superiority of crops grown on fallows that had been well worked after the February and March rains. There are other contributing factors. They will be dealt with later.

Results.

CROPS—SECTION I.

Best half of Farmers' Wheat Crop, not less than 75 acres.

Name.	Varieties.	Yield.	Trueness to type.	Freedom from disease.	Freedom from weeds.	Evenness.	Total.
Total Marks	.. .. ..	**35**	**20**	**15**	**15**	**15**	**100**
Crouch Bros. ..	Federation ..	34	19	14	10	13	90
R. Blackwood ..	Penny and Federation	29	19	14	14	13	89
R. D. Buckley ..	Penny and Federation	29	16	14	14	13	86
A. W. Goodwin ..	Federation ..	30	15	9	15	14	83
C. F. H. Reichelt ..	Federation ..	25	18	13	13	13	82
A. A. Werner ..	Penny and Federation	22	15	13	11	11	72
W. Dahlenburg ..	Federation, Yandilla King, Gallipoli, Major	14	20	13	13	12	72

Messrs. Crouch Brothers' winning crop of 115 acres of Federation was grown on winter fallow. This was ploughed in June, and scarified in September; after harvest it was harrowed, and after the February rain it was spring-toothed. The land was again spring-toothed before drilling in May. Fifty-six lbs. of wheat was used and 70 lbs. of superphosphate.

This crop received at least 9 inches of rain during the growing period, and according to the owners also got the benefit of further heavy storms. The crop was true to type and free from disease, but was rather dirty with wild oats.

A further paddock of 110 acres of Federation sown on summer fallow was also inspected. The crop was also very heavy. There was no opportunity of determining the comparative value of summer fallow in this case, because the rainfall had been different—both were very creditable crops.

Mr. Robt. Blackwood's Heavy Crop of Penny Wheat at Kiata East—1¼ bushels of seed and 112 lbs. manure.

The second prize crop—that of R. Blackwood, of Kiata East—comprised Penny and Federation. The rainfall was much lower than that received at Kaniva. The crop was sown on summer fallow, which had received the following treatment:—Ploughed in March, then harrowed, and in July scarified; subsequently it was scarified in the spring, and harrowed twice. After harvest it was harrowed, following on a summer rain, and spring-toothed a week later. It was again spring-toothed in the first week in April, and scarified before the drill in the first week in May. It was then drilled with 1¼ bushels of seed and 112 lbs. of superphosphate.

Messrs. P. N. McLennan, "Banavie," Marnoo, and James E. Hutchings, "Dalmore," Rupanyup, are other Wimmera farmers who have grown splendid crops, using heavy dressings of superphosphate. The first named used 100 lbs. per acre, and the latter 120 lbs. in two instalments.

Mr. Blackwood's crop was dense, level, well headed, and free from disease. It was true to type, the seed, like that of Messrs. Crouch Brothers, having been derived from the experiment farms within recent years.

The appearance of this crop, so heavily manured, should dispel the last doubt in the minds of many farmers that heavy dressings of "super." are liable to "burn" off the crop in dry years. In truth the very opposite is the case; "super." helps the plant to defy drought by encouraging vigorous rooting and early maturity, and by assisting the plant to economize the soil moisture.

Mr. Buckley's crop of Penny and Federation was grown at Lawloit on red ground. The rainfall for the year was about 15 inches; there were six cultural operations involved in raising the crop, 80 lbs. of seed were used for sowing the Penny, because of its larger grain, and 75 lbs. of manure. The crop was harrowed after it was up, with the object of breaking the hard crust to which the red soil is liable. It was a splendid crop.

Mr. R. D. Buckley's (Lawloit) Crop of Penny.

Mr. Dahlenburg's crop received only 5 inches of rain during the growing period—a remarkable accomplishment. It was exceptionally true to type. Seventy-five to 80 lbs. of seed were used, and 100 lbs. of superphosphate.

SECTION II.

Mallee Crop, 100 acres.

Name.	Varieties.	Yield.	Trueness to type.	Freedom from disease.	Freedom from weeds.	Evenness.	Total.
Total Marks	.. .. ..	**35**	**20**	**15**	**15**	**15**	**100**
C. F. H. Reichelt ..	Federation ..	23	18	13	13	13	80
Mrs. M. M. Mackenzie	Federation ..	20	15	12	13	14	74
McKenzie and Petchell	Federation ..	17	15	12	12	14	70

The winning crop in this section was one that created a good deal of interest in the district, because it was grown on poor land, originally covered with stunted broom bush, and long regarded as practically worthless for wheat growing. It is well to note that this land is not exactly typical of large areas covered with similar vegetation which

Mr. C. F. H. Reichelt's 1st Prize Crop of Federation. Grown on poor broom-bush Mallee land.

Mrs. M. M. McKenzie's Mallee Crop of Federation.

exist on the desert fringe. The soil is a light yellow sandy loam overlying an extremely retentive clay. The combination is almost a perfect one for conserving moisture, for it is possible on a well-worked fallow of this type, even on a hill top, to squeeze free water out of the clay in the middle of summer. It is obvious that such a paddock

is a good one in a dry year, and conversely there would be a tendency for it to waterlog in a wet one.

The crop that Mr. Reichelt has succeeded in raising on it this year is nevertheless exceedingly meritorious. The land was fallowed in June and July, and it was then harrowed twice, and subsequently spring-toothed four times at appropriate intervals, and finally the seed was sown with the combined spring-tooth cultivator drill in May and early June. One bushel of selected Federation was used and 50 lbs. of superphosphate.

It is quite possible that land of a character similar to that of Mr. Reichelt's, in view of its moisture-retaining properties, will have a special value for raising summer crops, such as millet and sorghum, and possibly also lucerne.

According to Mr. George Batson, it is already known that the ordinary broom bush land will produce wine grapes of the first quality.

Mrs. M. M. Mackenzie's crop was grown on ordinary Mallee land at Glenlee. On this land the clay is relatively near the surface. The land was ploughed in July to 3½ inches; it was harrowed, then spring-tooth cultivated, and harrowed again. In March after rain it was again spring-toothed. In May it was scarified and drilled during the end of May with 60 lbs. of Federation wheat and 62 lbs. of superphosphate.

Fallows.

Mention has already been made of the fundamental importance of careful working of the fallows in the Wimmera. The prime object is to conserve moisture for the succeeding crop by creating a blanket of loose mellow dust which will reduce to a minimum the evaporation from the soil surface. Four inches of rain, representing an extra 15 bushels of wheat, can be saved in this way if the work is faithfully done.

The secondary objects of fallowing are to clean the land of weeds, to create fresh supplies of plant food for the succeeding crop, to consolidate the soil, and finally to distribute the labour of the farm more evenly.

Results.

SECTION III.

For best fallowed land, not less than 100 acres. All competitors' land to be shown.

Name.	Soil Type.	Moisture.	Mulch.	Weeds.	Cultiva-	Total.
Total Marks ..	.. .. ..	25	25	25	25	100
R. Blackwood ..	Black, red patches	23	24	25	25	97
W. Dahlenberg ..	,, ,,	22	24	25	25	96
Crouch Bros. ..	,, ,,	25	23	24	23	95
James Moulden	,, ,,	22	23	25	24	94
Peter Bone, jun.	,, ,,	22	22	23	23	90
A. W. Goodwin ..	,, ,,	23	22	20	22	87
H. Crouch and Whisson	,, ,,	24	21	20	21	86
A. H. Schuller ..	,, ,,	20	19	24	21	84
R. D. Buckley ..	,, ,,	19	19	23	20	81

The fallows seen at Nhill this year were on the whole in good order, though, as was to be expected, they were deficient in moisture. There was a somewhat unusually large area of summer fallow following on the summer rains.

R. Blackwood's fallow comprised 195 acres of summer fallow and 45 acres of winter fallow. One hundred and forty acres of the summer fallow followed oats, and the remainder is on grass land.

The grass land was eaten bare, and ploughed in March; subsequently it was harrowed, and in June scarified, and then spring-tooth cultivated. The summer fallow after oats was ploughed in February and March, then harrowed; it was scarified in June, and subsequently spring-toothed three times, receiving in all six operations. The winter fallow was ploughed in June, and subsequently received three harrowings and two strokes with the spring-tooth.

The whole of this fallow was in excellent condition; the moisture content was high, mulch deep and mellow, and the soil underneath moist and well consolidated.

Mr. W. Dahlenburg's fallow also comprised 195 acres, 80 acres of which were summer fallow; it received similar treatment to that of Mr. Blackwood, but the moisture content was not quite so high. On both fallows there was a complete absence of weeds.

Messrs. Crouch Brothers and Mr. James Moulden also showed commendable fallows.

Summer Fallow *versus* Winter Fallow.

During the past decade increasing numbers of farmers have begun to summer fallow portion of their land. This year, of sixty or seventy farms inspected in five Wimmera districts, fully 50 per cent. had some summer fallows.

In summer fallowing the stubbles of the preceding crop are heavily grazed after harvest, and then burnt; or if in grass the paddock is eaten bare. In February or March the land is either ploughed, disced, scarified, and sometimes, if the soil is very friable, merely harrowed. This operation mulches the surface, and leaves the land in perfect condition to germinate rubbish when the first rains come.

The majority of farmers claim that they secure a greater amount of early feed by this means than would result if the land were left in stubble or grass until the normal fallowing time.

From July onwards the summer fallow is treated as an ordinary fallow, except that if it is ploughed in the first instance it will not be reploughed in the winter. The summer fallow, therefore, lies four or five months longer cultivated than the winter fallow. This assists it in retaining more moisture. Another advantage is that the teams are given work at a time when they would normally be idle, and pressure at the ordinary fallowing time is thus reduced. In addition, the land is cleaned, because the weeds are germinated earlier and in greater quantity, and it is generally found that after summer fallowing the soil breaks down very readily into a fine, friable, mellow tilth.

The general consensus of opinion among Wimmera farmers is that year in and year out the yields of wheat on summer fallow are higher than those on winter fallow. That was certainly the case in 1917 and 1918, but this year the patchy character of the rainfall has to a certain extent interfered with the comparisons.

One very valid objection to the practice is that there is a greater drain on the organic matter of the soil, especially where the stubbles are burnt, than when the ordinary methods are adopted. Its widespread adoption over the whole of the area fallowed on each farm is not therefore advisable—indeed from the point of view of economy of labour there would be nothing to recommend it; but on 90 per cent. of the farms in the Wimmera to-day a portion of the stubbles are

Testing Mr. R. Blackwood's Fallow at Kiata East for Moisture.

Sheep Assist in Consolidating Fallows on Black Land and in keeping the Surface Stirred.

regularly burnt and fallowed up for wheat, so that in these cases, if the land were summer fallowed, the loss of organic matter would be little, if any greater.

Cases can be quoted where the land has for years been regularly summer-fallowed and cropped with wheat without a spell, and yet it is yielding even heavier crops of wheat than before, though takeall and flag smut are gradually increasing, and will eventually compel the resting of the land and the adoption of a rotation system including oats.

The heavy crop of Federation wheat previously quoted as having been grown by Mr. P. N. McLennan, of Rupanyup, is a case in point. The paddock has had a crop of wheat taken off every second year for fourteen years, and the stubble was burnt, and the land summer-fallowed each year. The crop will average eleven bags.

SECTION IV.

For best red fallowed land, not less than 100 acres. All competitors' land to be shown.

Name.	Soil Type.	Moisture.	Mulch.	Weeds.	Cultiva-	Total.
Total Marks ..	.. .. ..	**25**	**25**	**25**	**25**	**100**
C. F. H. Reichelt	Light red sandy loam over red clay	25	23	22	23	93
Mrs. M. M. McKenzie	Red loam ..	18	22	25	21	86
E. Tassicher ..	Red clay loam ..	19	18	24	19	80
R. D. Buckley ..	„ „ ..	18	18	24	17	77
H. Reichelt ..	„ „ ..	15	16	18	17	66

The Nhill district contains considerable areas of red land which is somewhat refractory to work. This competition was initiated with the object of stimulating greater interest in the methods of working soils of this type. The number of entrants this year is gratifying.

Mr. Reichelt's fallow, though red, could not be strictly classed with the majority of the red land in the district. It was a red sandy loam overlying a retentive clay—land recently cleaned of broom bush. It was ploughed in July, and then spring-tooth cultivated.

Mrs. M. M. McKenzie's fallow was practically a two-year's fallow; nevertheless the moisture was somewhat deficient.

The other fallows were all somewhat unevenly worked.

SECTION V.

Best Wheat Crop (1919) on fallow judged in 1918. Prize for aggregate points of crop and fallow.

Name.	Variety.	Yield.	Type.	Disease.	Weeds.	Even-ness.	Total.	Total for Fallow.	Grand Total.
R. Blackwood	Penny and Federation	29	19	14	14	13	89	92	181
Crouch Bros.	„ „	29	18	14	14	14	89	90	179
C. F. H. Reichelt	Federation ..	20	18	13	13	13	77	90	167

In this competition both the crop and the fallow on which it was grown are judged. In Mr. Blackwood's case it was the same crop as has been described in Section I. It was grown mainly on a summer fallow.

Messrs. Crouch Brothers' crop in this section was also grown on a summer fallow. The paddock was ploughed in March and April, and then scarified in the spring. Afterwards it received two scarifier harrowings in October and November. After harvest it was scarified in April, and then spring-toothed and drilled in May with 60 lbs. of Federation wheat and 80 lbs. of superphosphate.

SECTION VI.

For the highest aggregate of points awarded for—the whole of a Farmer's Fallow, 1918; the whole of a Farmer's Crop, 1919; the whole of a Farmer's Fallow, 1919; the whole of a Farmer's Crop, 1920.

Name.	Fallow.		Crop. 1919.	Total.
	1918.	1919.		
Crouch Bros.	82	89	86	257
R. Blackwood	83	91	77	251
P. Bone, jun.	89	80	77	246
C. F. H. Reichelt	84	80	68	232
H. Reichelt	91	62	68	221
J. Collins	82	(Withdrawn)		
O. H. Lienert	82	(Withdrawn)		

This competition was initiated in 1918 by Mr. A. G. Schultz, who is the donor of the prize. The whole of the competitor's crop and fallow must be shown and judged on points for the series of years shown. Last year much of the fallow on the farms proved on investigation to be in a somewhat neglected condition, even though the "front door" fallow was in excellent order.

This year the considerable improvement that has taken place on farms entered for the competition has more than justified the practical interest taken in the matter by Mr. Schultz. It is somewhat unfortunate that the uneven distribution of the rain has to a certain extent been to the advantage of some of the competitors.

SECTION VII.

Best Wheat Crop grown on fallow land—the fallows to be judged on points, 1919, and the crop grown on this fallow to be judged on points 1920. Fallow and crop points to be added together.

Name.	Soil Type.	Moisture.	Mulch.	Weeds.	Cultivation.	Total.
R. Blackwood ..	Black, red patches	23	24	25	25	97
W. Dahlenburg ..	,, ,,	22	24	25	25	96
Crouch Bros. ..	,, ,,	25	23	24	23	95
James Moulden	,, ,,	22	23	25	24	94
C. F. H. Reichelt	,, ,,	25	22	23	23	93
Peter Bone, jun.	,, ,,	22	22	23	23	90
A. W. Goodwin	,, ,,	23	22	20	22	87
H. Crouch and Whisson	,, ,,	24	21	20	21	86
A. H. Schuller ..	,, ,,	20	19	24	21	84
R. D. Buckley ..	,, ,,	19	19	23	20	81
E. Tassicher ..	Two-thirds black, rest red	19	18	24	20	81
H. Reichelt ..	,, ,,	17	18	18	19	72

In this section the fallows are judged one year, and the crops on these fallows next year, the prize being awarded for the highest aggregate obtained by adding both lots of points together. The principal fallows are similar to those in section III. already discussed, and need no extra comment.

Conclusion.

DISEASES.

No report of this character would be complete without some reference to the three common diseases of wheat which are silently yet persistently ravaging our crops. I refer to Stinking Smut, Takeall, and Flag Smut, or Black Rust as the latter is sometimes called.

Stinking Smut is a disease which can be entirely controlled by proper pickling methods, yet 25 per cent. of the crops which were submitted for competition in the Wimmera this year were affected—5 per cent. of them seriously so. The dry season, of course, weakens the plants and renders them more susceptible to attack, but the source of infection was due to the use of improperly pickled seed, and to nothing else. In every case where there was infection, inquiry showed that rule of thumb methods of mixing the pickle and wetting the seed were in vogue, or else precaution had not been taken to remove all smut balls from infected seed sown.

There are a number of methods of pickling wheat, but they are all liable to fail at some time or other if the pickle is not weighed, if the water is not measured, and if the wheat is not dipped for the standard time, no more and no less. Seed containing just an odd ball of smut, if used, must be dipped, and the smut balls skimmed off.

There is a grave danger of a more serious outbreak of ball smut next season if precautions are not taken to carefully pickle all seed.

The standard strengths of pickle are bluestone, 1½ lbs. in 10 gallons of water, with immersion from three to four minutes. Formalin, 1 lb. in 45 gallons of water, with immersion from three to four minutes.

If a pickling machine in which the grain can be poured into the solution is not available, each bag of wheat should be broken into two or three butts, leaving them open at the top. They may then be dipped in the pickle, and shaken up and down vigorously, then skimmed and drained.

Losses should be made up with fresh solution of proper strength.

Unlike Stinking Smut, infection in the case of Takeall and Flag Smut can take place from the soil. The only effective method to reduce these evils is clean fallowing, working after every rain, and the growth of more oat crops in the rotation.

These two latter diseases have recently made their appearance in American wheat fields, and their presence is viewed with such alarm that drastic quarantine measures have been resorted to with a view to their early eradication. Few Australian farmers realize the extent of the damage these two diseases annually cause to their wheat yields. They probably cost every farmer growing 2,000 bags of wheat from twenty to fifty bags annually.

Pastures for Livestock.

In my report of last year I went to some length to stress the importance of improving the carrying capacity of the temporary idle or resting portion of the farm.

I suggested that there were two obvious ways in which that improvement might be effected—one, the improvement of the temporary pasture by the sowing of a suitable plant with the preceding cereal crop, and the other that greater use might be made of oats or other plants as a catch crop for early autumn feed.

During the coming autumn feed will be at a premium, and the wise farmer will endeavour to meet the want by sowing in March a catch crop of oats, barley, or rape on the friable stubbles that are a feature in the Wimmera this year.

Mr. R. Blackwood's Crop of 150 acres of Federation Wheat with which Wimmera Rye Grass was Sown at the Rate of ½-lb. to the Acre. The Sample of Grass Exhibited is a Representative One.

Mention was also made in the last report of the high feeding capacity of the "Wimmera" rye grass—lolium subulatum. At the same time it was stated that it would be necessary to treat the grass with some caution, because it would probably prove troublesome to eradicate from wheat land. Its remarkably high carrying capacity has been again confirmed in the Wimmera this dry season, both on private farms and on the State experimental plots, but the question of how far the grass is likely to constitute a pest has not been answered yet. It will, indeed, take several years of trial under varying conditions before this can be definitely settled.

Two farmers in the Nhill district, R. Blackwood, of Kiata East, and W. Dahlenburg, of Salisbury, have given the grass a trial this

year. Mr. Dahlenburg sowed the grass on stubble land on a red loamy hill. The paddock after being heavily fed off till the middle of October was closed up. At the time of judging the grass was about 10 inches high, green, and forming seed freely.

Mr. Blackwood sowed the grass at the rate of ½ lb. to the acre with the wheat crop on 150 acres of red land, with the object of increasing the carrying capacity of the paddock, which will be spelled for several years. The seed was mixed with the manure and sowed through the manure run of the drill. The grass, though of course thin, has made excellent growth, and at the time of judging was 18 to 20 inches high and seeding well. It will not interfere with the harvesting of the wheat. A photo of this crop is attached.

Messrs. Caldow Brothers, of Goroke, where the rainfall was 15 inches this year, using 1½ lbs. of the grass with the wheat, have obtained similar results. In their case, owing to the moister conditions, the grass grew much more strongly.

Local farmers will therefore have ocular demonstration in these instances as to the usefulness or otherwise of the grass under their own conditions.

. . . . . .

In conclusion, I have again to tender my thanks to the secretary, Mr. Charles Towns, and the stewards for their assistance and courtesy during the work of judging; also to the various farmers for their hospitality.

TO ESTABLISH HAWTHORN HEDGES.

It is not practicable to sow hawthorn-berries where a hedge is to grow. Germination is so slow that it would be almost impossible to keep the ground from being overrun with grass and weeds, which would smother the seedlings. The method is to gather the haws when ripe, and at once bury them in a hole made in the ground, the spot chosen being where water will not hold in the soil. In cold countries the haws are stratified in sand or suitable soil, but burying them in the ground is best in this country. In spring the haws are taken up, passed through a fine riddle, and then sown in nursery rows. Many of the seeds do not germinate till the second spring, but usually a fair proportion grow the first season. It is not actually necessary to transplant them until the plants are strong enough for planting as a hedge. To make a cattle-proof hedge the plants should be 6 inches apart in a double row, the rows about 9 inches asunder. After planting the plants should grow for two years without being cut. They should then be cut down to within a few inches of the ground, this being done towards the end of winter. Very strong growth should follow, with plenty of shoots starting from the ground-line. After this an annual or biennial trimming is necessary. Hawthorn could not be expected to form a hedge that would turn cattle much under ten years from time of planting.

—*New Zealand Journal of Agriculture.*

THE BEET SUGAR INDUSTRY.

By W. L. Williams, Manager, Beet Sugar Factory, Maffra.

PART II.

By-Products of the Beet Sugar Industry.

These are important, and are of particular value to any district interested in stock raising and dairying.

BEET TOPS.

Commencing in the field, the beet crowns and tops may be siloed or fed green or dry, and they are generally considered worth the rental value of the beet land. They are *ideal* for fattening stock.

A thrifty, far-seeing farmer would probably elect to plough them in, thereby restoring valuable mineral matter and humus to the soil. In this way the fertility of the soil may be well maintained, as by far the greater part of the plant food is to be found in the crown and leaves.

A 20-ton crop of clean beets per acre contains—

Plant Food.	In Topped Beets.	In Crown and Leaves.
	lbs.	lbs.
Potash	152	235
Nitrogen	60	113
Phosphoric Acid	36	80
Soda	24	199
Lime	16	208

It is evident that it must pay to plough in the tops, though to feed them off in the field with sheep and so return these plant foods in the form of manure has been found more profitable and good policy, providing the stock are withdrawn during wet weather.

BEET PULP.

Beet pulp consists of the beet slices exhausted of their sugar, and is a most valuable by-product. It represents about 85 per cent. of the beet, but loses a lot of weight when stored. It may be used immediately, or run into large open silos for use throughout the year. Dairymen use it very freely, as it has been found to stimulate milk production to a marked degree. It is evidently far more valuable as stock feed than its analysis indicates, being very succulent and exercising a stimulating and wholesome effect upon the digestive organs.

It should be fed with lucerne, other hay, or chaff to secure the best results and a well-balanced ration. Dairymen feed pulp at the rate of about 56 lbs. per day per cow, and it has not merely saved stock, but has kept many herds in profit-making condition during drought periods in the Maffra district. It is sold at from 2s. 6d. to 5s. per ton.

The siloed pulp rapidly ferments or matures, and in such state is found to be a more valuable stock food, though rather unpleasant to handle.

So long as a factory has capacity and demand enough to hold its beet pulp in a wet state it is probably wise and economical to do so, for the cost of drying is very heavy and only worth consideration when the quantity is very large and the local demand limited. The cost in fuel and plant to reduce the pulp from 89 per cent. of moisture to 10 per cent. is so high that it should only be considered for such surplus pulp as is not required for local use. Where large quantities are available the convenience in storage and distribution of dried pulp is undoubtedly attractive, and in America it has a wide distribution and a ready sale at high prices.

In Maffra the demand for wet pulp for use during the dry months is now far ahead of the supply, and it is a valuable support to the dairying industry.

Feeding Beet Pulp to Cows.

MOLASSES.

Molasses is an important by-product containing 48 to 50 per cent. of sugar not readily crystallizable. Although not so pleasant to the taste as cane molasses, its feeding value is good, and it is largely used for stock-feeding purposes with great advantage. Quantities are also used by distillers for the manufacture of methylated spirit.

Where the quantity of molasses is large enough to warrant a heavy outlay on plant, it may be treated by the "Steffen's" process for the extraction of the greater part of its sugar, and the residue is then frequently evaporated for its potash, now so valuable.

LIME SCUM.

Lime scum is the waste lime remaining after the refinement of the beet juices, and in process it has absorbed an amount of organic and other useful fertilizing matter. After it has dried out sufficiently to handle, it may be spread with great advantage on heavy and sour lands, improving the physical condition of the soil, correcting acidity, and making more readily available the mineral plant foods in the soil.

Many farmers seem not yet as interested as they should be in the value of lime, particularly for the maintenance or restoration of the fertility

of their continuously cropped areas. Where a sugar mill is rightly located the lime scums may be run off with the large quantities of waste water and used for irrigation purposes. Spreckles' large Sugar Mill in California distributes the waste water and lime in this way over miles of country, and it has a very favorable influence on the heavy adobe soils.

Sundries.

Waste ashes and cotton filter cloths find much useful service, and a beet sugar factory economically run, and rightly appreciated, may turn its products and by-products to full advantage, the by-products in particular being a great support to stock and dairy farming.

Beet Crop at Cowwarr.

Beet Growing.

General Particulars.

Successful beet growing calls for good soil, intense culture and suitable climatic conditions. No firm rules can be prepared to meet the varying conditions under which beet may be grown, and every farm and every season has its peculiarities, demanding keen individual attention and frequently modified methods.

Climate.

While the wild beet finds its home on the sea-coast areas of tropical climates the improved sugar beet gives the most satisfactory results in temperate climates.

Soil.

Although beets are grown on a variety of soils, it is advisable here to select the best land with a view to securing good yields that will more easily bear the high costs of production. When the industry is thoroughly established beets may be grown on poorer lands for the

indirect advantage of improving such soils for other crops. The intense culture and deep-rooting habits associated with beet growing will undoubtedly, as in Europe, have a valuable influence on the fertility and production of our second-rate soils.

Rich sandy or silty loams and heavy loams with a good depth of soil and comparatively free subsoils are desirable. A good type beet must root deep, so that waterlogged areas and soils with an impervious hard pan near the surface are unsuitable unless such faults are corrected. Raw peat lands are not desirable. Sandy heath lands often produce impoverished or stunted beets high in sugar content.

CULTIVATION.

Where convenient, the beet land should be deep ploughed, or ploughed and subsoiled, in the autumn up to 12 inches, and allowed to mellow during the winter. In the early spring the area should be surface cultivated or shallow ploughed and brought to a fine tilth, with a well firmed soil and a fine seed bed. Good preliminary cultivation is a long step towards success and economy in growing the beet crop.

SEEDING AND FERTILIZING.

Seeding should immediately follow the final cultivation of the seed bed in order that the weeds may have no advantage over the beet seed.

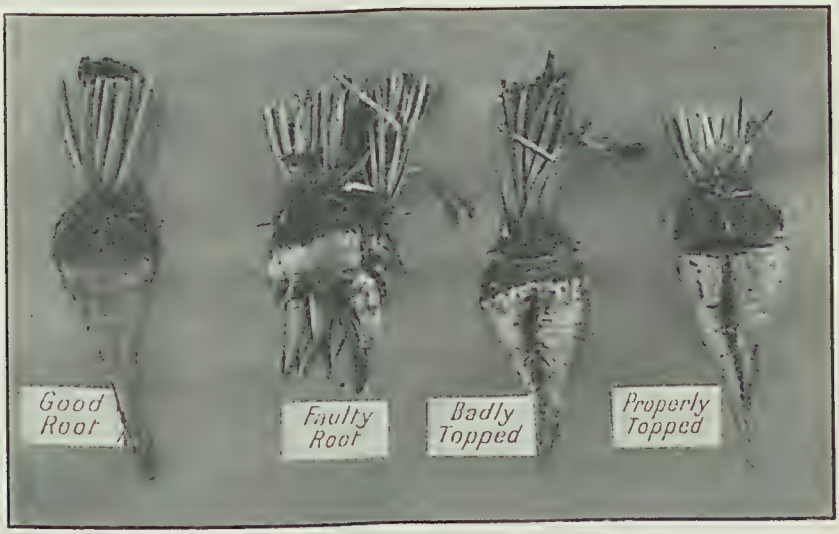
If the soil is dry, free, and warm, sow on a rolled surface; if moist and disposed to cake, plant on a harrowed surface about ½ inch deep for early sowings, and deeper for the late sowings. Sometimes growers plant the seed very deep in loose soil, and generally secure a slow, thin, unsatisfactory germination. A special four-row beet seed drill is used, with rows 18 or 20 inches apart, the most favoured widths for yield of sugar per acre. About 12 lbs. of seed is sown per acre, because it is necessary to secure a rapid strong germination, the germinating seeds helping one another through. The Maffra district is generally warm and fairly early, so that some plantings may be made, if the weather conditions are favorable, as early as July, but very early plantings are liable to run somewhat to seed with a consequent loss in sugar content. August plantings are considered early, September normal, and October-November plantings late.

Superphosphate is drilled in beforehand or with the seed, and has consistently proved beneficial to the growth of the plant without disturbing the sugar content and purity of the beets. The quantities used locally range from ½ to 2 cwt. per acre.

The well-farmed soils in this district seem to have plenty of nitrogen available, and it is no advantage to unduly force the growth of leaves to the detriment of the roots. The beet uses up a quantity of potash which seems to be sufficiently plentiful in this district, but would probably have to be added in the form of sulphate of potash in most well established beet areas. By ploughing in the beet crowns and tops a great part of the plant food absorbed by the beets may be restored to the soil. Beets thrive in well limed soils, and growers have not yet seen fit to use the mill waste lime as freely as they should.

Cultivation.

Early plantings should germinate in a fortnight, late plantings in a week, and directly the rows are defined the area should be rolled and followed by four-row beet cultivators fitted with special sweeps that will cut very close to the rows without disturbing the beets. This first cultivation can hardly be done too early, and is most important in checking the weeds, giving the beets a strong, clear start, and making the thinning conditions easy and economical. The growers who neglect or delay their first cultivation almost invariably pay dearly for it subsequently. The intertillage is not costly, as a four-row machine will comfortably do 10 acres a day, and should be applied after thinning and after rain as frequently as necessary to keep the soil in the best condition and free of weeds.



Thinning and Sidehoeing.

Beet thinning is the principal hand work, and is done by casual labour on contract. As a rule it is best for the grower to devote his own time to the cultivation work, and have the thinning done quickly by contract labour at the ruling rates.

Thinning should be done soon after the first cultivation, and commenced while the beets are quite small, as young beets are easier to thin than forward beets, and such thinning is more satisfactory for the contractor. Furthermore, if delayed, the weeds soon develop, and the beets get overstrong and are difficult to handle, thereby adding to the cost of thinning. The absorption of moisture by a full stand of beets allowed to remain too long unthinned is a heavy pull on the soil, and will invariably reduce the yield of beets to a tonnage considerably below those sections thinned at the correct period. Experience and costs have repeatedly shown that it is better to err on the early side than on the late side when thinning beets.

Thinning is done with short-handled hoes to space the beets. The left hand of the operator is free to thin the beets to a single strong plant at distances approximately 8 inches in very rich, moist soils, 10 inches in

good beet soil, and 12 inches in medium or drier soils. Many thinners become very expert at the work, and do as much as half an acre and sometimes more per day.

The development of single germ seeds would be a great advantage to thinning, and checkrow planting a possible improvement.

Sidehoeing is done with long-handled hoes a few weeks after thinning to remove all weeds growing in the rows, the cultivator destroying everything between rows. Sidehoeing is frequently done by contract at prices varying according to the cleanness or otherwise of the crop. Beet thinning and sidehoeing are in process in the Maffra district from August to December.

Lifting Beets.

IRRIGATION.

Although the beet crop holds remarkably well through dry periods because of its deep-rooting propensities, irrigation is undoubtedly very desirable in the Maffra district. It is a summer crop that absorbs a large quantity of moisture, and if by irrigation an abundance of this can be supplied during the youth of the plants to keep them growing freely without any check, much better quality beets will be secured than if the plants are severely checked by lack of moisture in the summer, and subsequently develop an abnormal growth in the autumn. High quality beets need an abundance of moisture during the spring and early summer, and comparatively dry conditions towards autumn in order that high sugar content and purity may be encouraged to the utmost. This can best be regulated by irrigation. Any system of irrigation may show good results, but undoubtedly the furrow system is the best. Every second row should be furrowed out with irrigation shovels placed on the cultivator. These furrows should be connected with the service channel or pipe, and water admitted in sections, as many rows as the water will supply being irrigated at the one time. In this way the water may be well controlled, and through the loose furrows it soaks well down to the subsoil without smothering the leaves, and very soon after the

furrows may be cultivated to conserve the moisture. In this district irrigation is generally of most value in December and January, and sundry crops irrigated from time to time have responded most profitably.

Harvesting.

The term of beet harvesting usually extends over the period March to June. A special two-point beet lifter is used to lift the beets, or a single furrow plough stripped of its mouldboard. The topping is done by contract at a price per ton, depending on the yield, and occupies a number of men. The beet toppers pull and shake the loosened beets, and throw them into rows. Then with large beet knives they slice off the crown and tops, throwing the roots into heaps clear of weeds, &c. The carters fork the beets into drays, haul them to the factory or railway siding, have them weighed and tared for dirt and faulty topping, and tipped from high beet loading platforms into trucks or dumped direct into the beet bins ready for manufacture.

Beet Harvesting.

Excepting the crowns and tops, which remain with the grower as valuable stock feed, the whole bulk of the crop has to be carted, and it would generally be considered unprofitable to cart beets more than 5 miles by road. The limits by rail depend on freight and loading conveniences. A good average yield of clean beets is 12 tons per acre, but a diligent grower should expect to do better than this.

Beet Pests.

The only serious trouble so far in this district has been occasional damage to the young beets by cutworms and tomato weevils, but if taken in time these can be checked by the use of Paris Green or Arsenate of Lead.

Nematodes, beet blight, rust, root rot, &c., have not yet occasioned any difficulty, and by rotation and careful cultivation growers should endeavour to avoid such troubles.

Rabbits are partial to young beets.

General.

Good cultivation is essential to beet growing, and this is the main reason why beet growing improves the soil for other crops.

Fertilization is very desirable, and growers in the Maffra district have now come to realize this, and seldom plant without fertilizers.

The application of Lime is good policy, but not yet practised to any extent here.

Irrigation is the best assurance for consistent and profitable yields, and with a large irrigation system in course of construction for this district it should benefit beet growers.

Systematic rotation of crops is very important, but rarely practised here; partly because farmers have been fortunate enough to get along all right without it. But as reducing areas, higher values, and increasing costs come into conflict with decreasing fertility, rotation will find its

Weighing Beets—Powerscourt Siding.

proper place in the maintenance and improvement of the productivity of the soil. Mainly have beet growers neglected rotation because they have to lease land at high rentals for short terms, and are compelled to grow beets on the same land from year to year. Although continuous beet cropping is bad practice and not approved, it is interesting to note that in spite of those who contend that beet growing injures the soil, sugar beets have now been grown on some portions of the Swan Estate, Stratford, for six consecutive years, and produced good crops every year. Regarding the influence of beet growing on other crops many favorable results have been observed. Four years ago Carr's Estate, Stratford, showed evident signs of being crop sick. It was leased and put under beet for two seasons and yielded well. Immediately after the beet was lifted in July, 1918, it was hurriedly

planted to barley and oats, and yielded heavy crops of barley and 3 tons to the acre of oaten hay, quite superior to any adjacent crops. This area has again been cropped with barley and oats, and is yielding splendidly, and the oaten hay will again go 3 tons to the acre.

A farmer who follows diversified farming and rotation is well advised to give his best attention to 5 or 10 acres of beet rather than indifferently care for larger areas. A grower who is experienced and devotes himself almost wholly to beet growing need have no anxiety about handling 100 acres of beet.

Beet Pulp Storage Silo.

Beet thinning is the main cash item of expense in the early stages, and the factories generally advance on any well cared for crop sufficient to meet this expense. As soon as deliveries commence growers secure progress payments to meet the cost of harvesting.

Labour is not difficult to secure if a good run and reasonable accommodation can be offered.

In America there are now being fully tested two beet harvesting machines designed to mechanically lift the beets, top, and place them ready for carting. These show great promise of success, and, if so, they will be a great economy, convenience, and encouragement to beet growers.

The following is a very general estimate of beet growing costs, which vary considerably according to the man and his methods, the farm, and the season:—

General Beet Growing Methods and Approximate Costs.

Dr. Particulars.	Costs per Acre. £	*s.*	*d.*
1. Select the best land unless a strict rotation can be followed. Rent ..	1	10	0
2. Plough or cultivate deep in autumn, about 10 inches or 12 inches ..	0	15	0
3. Cultivate	0	2	6
4. Plough or cultivate just medium depth in early spring	0	10	0
5. Cultivate to good tilth, and fine clean seed bed	0	6	0
6. Seed about September, 18-inch or 20-inch rows, ¾ inch deep, 10 to 12 lbs. seed per acre, and fertilize	1	2	6
7. Cultivate with special four-row cultivator immediately rows can be traced	0	2	6
8. Thin when beets are very young to single beets at 10-inch to 12-inch spaces by contract	1	10	0
9. Side-hoe beets	0	10	0
10. Cultivate with special cultivator as required	0	7	6
11. Irrigate and cultivate in December if required	..		
12. Lift beets, special lifter, March to June	0	10	0
13. Top beets by contract, 15-ton crop	2	5	0
14. Deliver beets to factory, approximate	2	9	0
Total costs	£12	0	0

Where a grower owns his own land, and fully works his own teams, he may pocket of these costs about half.

If rightly irrigated the additional expense incurred should be handsomely repaid.

Cr. Particulars.	Receipts per Acre. £	*s.*	*d.*
1. Clean beets, 15 tons, at 27s. 6d.	20	12	6
2. Beet tops, for fattening or dairying	1	0	0
Total receipts	21	12	6
Costs	12	0	0
Net direct profit	£9	12	6

A good farmer under normal conditions should secure this return, but an indifferent farmer or adverse conditions may considerably lower the result.

A good farmer under fortunate conditions may increase the advantage.

The above costs at the moment are inclined to rise, but against this the local price for beets has been increased to 30s. per ton.

(*To be continued.*)

TOBACCO CULTURE.

By Temple A. J. Smith, Tobacco Expert.

(Continued from page 756, Vol. XVII.)

Saving Seed Plants.

The tobacco plant is a prolific seeder, one plant producing enough seed for 10 acres, consequently only a few plants need be saved for seed, but great care should be taken in selecting those most suitable, for the following reasons:—Early maturity is one of the most important, as early ripening means less labour in attention to the crop in the field, and less risk of loss by frost, hail, or other causes. By a continuous system of selection with this end in view the period of growth can be lessened by several weeks, whereas if no attention is paid to this phase of seed production the period of growth may be lengthened. Some tobacco varieties take twenty-two weeks to mature, while others ripen in twelve weeks; the advantages in the latter are obvious.

Only vigorous, healthy plants which are true to type and show the greatest proportion of good leaves of the right shape and size should be saved. Narrow top leaves are not desirable, and plants having more than two or three of these should be rejected. Plants growing the leaves close together on the stalk are more difficult to sucker, and do not cure so evenly, consequently these too should be avoided.

The lower branches of all plants should be removed, leaving only the top bunch of buds in the centre, so that the whole strength of the plant may be devoted to the production of as strong and virile a seed as possible. This practice also enables the seed to be more easily covered with muslin or paper bags to prevent cross fertilization when necessary.

When ripe the leaves should be stripped and the stalk cut well below the seed pods, and hung in the shed with the pods downward. Later the seed must be shelled by rubbing the pods open between the hands when it may be kept in Mason jars or any dry receptacle from which the air can be excluded.

Ripening Stages.

About six to eight weeks after the topping, that is removing the flower bud, the tobacco should ripen, though the actual time of ripening depends largely on the season. Ripe tobacco leaf has a rough feeling to the touch, and the colour changes from a dark green to a lighter green with a mottled appearance on the surface of the leaf. In dry seasons the leaf turns a light yellow colour on certain soils, and if left too long brown spots form on the leaf. Tobacco harvested before ripening will never cure well, neither will it have good smoking qualities; on the other hand tobacco over ripe will become woody and fibrous, and be brittle when cured.

Generally speaking tobacco should be harvested eight weeks after topping, whether it looks ripe or not. If it does not ripen by that time it will probably deteriorate if left in the field, and to leave it out

late in the season means risk of loss by frost. The usual custom in Victoria when harvesting is to split the stalk of the plant from the top to within 6 inches of the ground, using a knife specially made for the purpose, though a butcher's knife or small tomahawk is also used. The plant is then bent over, and the stalk cut off close to the ground, and the plant left to wilt for an hour or less according to the heat of the sun. The tobacco is then put in piles of five each with the butts all one way, and carted to the curing barns or scaffolds where it is hung on sticks 4 feet long and 1 inch in diameter, from eight to ten stalks being placed on each stick. Each plant should be well shaken out to loosen the leaves as it is placed with the tops downward on the sticks, these sticks full of tobacco are then hung on the poles in the barn about 10 inches apart, and can be placed closer as the tobacco cures.

Another system of harvesting which at present is not generally followed in Australia, but which is the usual practice in Sumatra and other tobacco producing countries where labour is plentiful, is that known as the single leaf method. Under this system each leaf is pulled as it ripens and placed in a basket, all leaves being kept straight and the butts all one way. The baskets when filled are carted to the shed and the leaves threaded face to face and back to back on strings or wires, a space of about 1 inch being left between each leaf.

It is claimed for this system that every leaf can be harvested at exactly the right stage of ripeness, "which is correct, as the bottom and middle leaves ripen earlier than do the top ones"; also that from 12 per cent. to 16 per cent. more weight is obtained, and that less shed room is required. When only small acreages are grown the single leaf system of harvesting has much to commend it, the chief objection being the amount of labour required and the extra time involved. Nowadays when the demand is all for flue-cured leaf, and the barn has to be filled in one day, the amount of labour required for the single leaf system of harvesting is under many circumstances out of the question.

Curing Tobacco.

Where the old system of curing is still in vogue the tobacco when harvested is hung on the hang sticks, and placed on the tiers in the sheds until they are filled and sun and air are admitted until the tobacco is cured. Hessian is hung round the sides of the shed and raised or lowered as needed to admit or exclude the sun and air during the curing stage, which conducted in this way will take from two to four months. A shed room 16 feet square and 17 feet to the eaves will be required for each acre of tobacco. This system of curing, which is really drying the tobacco instead of curing it, is fast going out of date, and it should only be followed with heavy dark grade tobaccoes, and these are greatly improved by flue curing. These remarks apply to plug tobaccoes, and not cigar leaf, which is cured in a special way, details of which will be given in another issue.

Flue Curing.

This process which has only recently been followed in Victoria has effected a great improvement in tobacco production, and is fast coming

into favour. It is being readily taken up by growers, the demand for flue cured leaf and the prices obtained for the same being very much greater than for the old heavy dark tobaccoes which are apparently dropping out of the market.

For flue curing a barn or shed 16 feet by 17 ft. 6 in. to the eaves is required (in some cases where large areas are grown 21 ft. 6 in. to the eaves will be found better) for each 5 or 6 acres of tobacco. Such barns are practically air-tight with ventilators at the bottom of the walls and in the roof of the building by which currents of air are controlled during the curing process. Flues 12 inches in diameter are run round the building close to the floor and 2 feet away from the walls, the heat being supplied by stoves of brick or iron, fed with wood fuel. Thermometers inside and outside the barn are required, and these must be constantly watched during the curing process, and the temperatures regulated according to the desire of the operator. The material for the barns may be brick, cement, wood (lined with some fire-proof material), or logs with the interstices closed with mortar. The cost of construction will, of course, depend on the availability of the material used.

Regulating the Temperature.

There are various systems of curing tobaccoes, and each type of tobacco requries its own special formula. No hard and fast rule obtains for any one kind, as the formula must be varied according to the condition of the crop in a particular season. In dry autumns the crop will come into the barn with less moisture than in wet seasons, and less time will be necessary to effect a cure.

The changes brought about in tobacco by flue curing are many, and if properly managed bring about a great improvement in the tobacco both in regard to colour and quality. A temperature of 90 deg. to 100 deg. Fahr. continued for from 30 to 36 hours causes slight fermentation, and opens the leaf cells when the sap in the leaf starts to the surface and is evaporated. The acids in the leaf act upon the starch, glucose and albuminoids in the leaf, causing the colour to change; chemical alterations take place, sugar being formed and ammonia evolved, and chlorophyl turned to xanthyne. When this stage is reached if the temperature is raised slowly, so as not to oxidize the organic properties in the leaf, the colour becomes fixed, but if the heat is raised too fast the leaf is reddened by scalding. On the other hand if the moisture is not driven off fast enough the yellow colour turns brown. Careful attention to this part of the process in curing yellow tobacco is very necessary, and the exact temperatures required to bring about the desired result depend at this stage on the observation of the curer.

What is known as sweating during the cure is the accumulation of sap driven by heat to the surface more rapidly than can be absorbed by the hot dry air; ventilation is then required to increase the draught, and at the same time the temperature must be increased.

1. The first stage is called the yellowing process, which can be obtained with a temperature of 90 deg. to 95 deg. Fahr., and is continued for from 24 to 30 hours, the vents being closed during the earlier part of the time.

2. The next stage is fixing the colour, which requires, first, four hours at 100 deg. Fahr.; the temperature should then be raised 2½ deg. every hour till 110 deg. is attained, which will take another four hours. Then continue to raise the heat from ½ deg. to 2½ deg. per hour for a further period of from four to eight hours.

3. The third stage is called killing the leaf, the temperature being taken from 120 deg. to 125 deg. in from six to eight hours.

4. The fourth stage is called curing the stalk and stem, which needs a heat of from 125 deg. to 160 deg., the temperature being raised 5 deg. per hour for ten hours or longer.

This last process must be continued until all moisture is driven out of the stem and stalk.

General Directions.

Do not go above 110 deg. until the leaves curl up at the ends.

It is better to go on the slow side rather than too fast until the operator has learned the art of curing.

The tobacco barn should be filled in one day, and the fires started in the evening for preference. If the outside temperature is over 90 deg. start at 5 deg. higher.

The manipulation of the vents to drive off the moisture evaporated will depend on the condition of the tobacco. If brown splotches appear on the face of the leaf the vents should be opened wider and the temperature increased.

If the leaf is being reddened the temperature is too high or being advanced too fast, and it should be reduced.

Flue Curing Mahogany Colour.

The tobacco can be placed on scaffolds near the open shed for from seven to nine days, packed close together. When it becomes yellow and mottled it should be placed in the flue curing barn and the heat kept at 100 deg. for four hours, after which it can be raised 2½ deg. per hour until 130 deg. is reached. Keep at this temperature until the leaf is cured, and then go gradually to 160 deg. until stem and stalk are dried out. This process applies specially to the heavier and coarser tobacco than that which will make the best yellow leaf. When cured the tobacco is softened by opening the doors and vents at night and watering the floor of the barn. The next morning the tobacco should be soft enough to take down, when it may be bulked in heaps, sticks and all, upon a wooden floor raised a few inches off the ground, and covered with cloths, bags, or tarpaulins to keep in the gases and warmth; this will enable the tobacco to slightly ferment. If put down in this way with too much moisture the tobacco will heat, and on the first appearance of this taking place this bulk should be rebuilt at once to cool it down; it should be watched carefully to see that this heating does not take place. The leaves may be stripped at any time after bulking (during the next barn curing if necessary) after which they can be baled for market.

Steam is sometimes used to soften the tobacco, and if this system is followed care must be taken to warm the tobacco to 90 deg. before hand, and not to over steam.

SUCCESSFUL DAIRY FARMING IN SOUTH GIPPSLAND.

J. S. McFadzean, Senior Dairy Supervisor.

During some thirty years past the country around Leongatha has been gradually brought from a rough heavily timbered area into one of the prominent agricultural districts of Victoria, and each year the dairying industry is making still further progress there. The land is mainly of two classes, viz., a light-grey loam, and a red-coloured loam of volcanic appearance, the former not nearly so rich as the latter, but still capable of producing fair crops, and grass holds well on it when sown down and kept clear of rabbits. In many places the red soil is

Tiddlewinks 2nd.

yielding very heavy crops of onions and potatoes; and, although there are no very extensive areas of creek flats, what there is of such land, is very rich, and will bring up to £70 per acre for dairy farming.

The farmers of the district are gradually making headway towards breeding a better class of dairy cattle; and towards this end a very definite step has recently been made by the formation of a local Herd-Testing Association. As most of the farms lie well back from the railway, cream production is the branch of dairying chiefly followed; and owing to the heavy butter-fat production the Jerseys are each year becoming more popular, and are to be found in most of the herds.

This breed has been established in this locality for many years past. When the Australasian Jersey Herd Society published its first *Herd-Book* in 1901, five of the bulls and sixteen of the cows, or actually between 6 and 7 per cent. of the total Australasian entries of pure-bred

Jersey cattle mentioned in it belonged to Leongatha. It is therefore quite in keeping with what might be expected that, while in 1917-18 two Jerseys from this district each ran into fourth place (in classes of 179 and 62 head) in the aged and 4-year old cows of all breeds tested by the Government, in this past year the winner and highest producer of all the aged cows of all breeds also came from Leongatha. Again, for many years Jerseys have been a feature of the annual Leongatha show, and owing to the quality of the competing stock, a win at that show has always been held of high value amongst the Gippsland breeders. Not infrequently also, owners of Jerseys near Melbourne have exhibited stock at this show with the hope of gaining a place in the prize list, the competition amongst Gippsland breeders from Hedley in the south-east to Nerrim in the north, and back as far as Dandenong, making the annual Leongatha show one of exceptional interest.

"Redford Stirling."

The farm of Mr. S. Rowe, on which last year's record yield in butter-fat production was made, is at Mount Eccles, some 16 miles from Leongatha on the Warragul-road, where this owner has bred Jerseys for over sixteen years.

The homestead is located on the top of one of the highest hills in this part, and from its outstanding elevation of 1,350 feet above sea-level a fine view is obtained in clear weather of the Southern Victorian coast line from Western Port to past Wilson's Promontory. With one exception, the several cultivation and grazing paddocks on Mr. Rowe's farm are on land falling away abruptly from the hill on which the homestead stands. On the adjoining farm the dairy herd has also been raised from stock sired by Jersey bulls, thus all the cattle in sight of Mr. Rowe's homestead are of Jersey breeding, and they show up as fine typical dairy stock and a credit to their breeders.

The soil on Mr. Rowe's property is somewhat poor in quality, being the light-grey loam before mentioned, but it grows fair hay crops, and when sown down after cultivation a good sole of grass is obtained; but the farm is a good example of the best being made of rather inferior quality

Some of Mr. Rowe's Stud Cows.

Healthy Calves.

country. The paddocks are kept clear of rubbish, and being wire-netted, are easily kept free of rabbits, which are very numerous throughout this district wherever similar precautions against them are not taken. Poisoning and trapping will make temporary reduction in the number of rabbits on any area, but they can only be kept in hand effectually

where all cover in the shape of fern and timber has been cleaned up, and the land guarded from further infestation by rabbits from adjoining properties. The results in this locality show that small holdings well looked after and cultivated for grass and fodder crops will not become overrun if properly netted, and it is only by close settlement of Gippsland hill country that rabbits will be kept under at a minimum expenditure.

Escutcheon of Tiddlewinks 2nd.

By much careful management of his farm, Mr. Rowe has been able to obtain a return from butter fat of £17.2 per head during the past year, a result most creditable from what is only very ordinary land, and on one of the most exposed situations in Southern Gippsland. The place furnishes splendid evidence of the hardy nature of Jersey cattle, for with only their rugs to protect them from the southern winds, these cows, when permitted, will feed all down the face of these hills in the coldest of weather.

A very interesting feature of the farm is its water supply. Within a few feet of the top of the hill and close to the homestead is an ever-flowing spring, giving a far greater supply than is necessary for the requirements of the stock, while all the twelve paddocks into which the farm is subdivided are well watered either by springs or by streams running from them.

The cultivated land on the farm covers 32 acres—an acre per head of the dairy herd. Twenty-eight acres are sown to oats for hay, and 4 acres to maize and millett. The hay crop this year was clean and well-headed, and fully equal to a good average crop for any year.

Mr. Rowe began breeding Jerseys in 1903 with stock purchased around Dandenong. Three years later he bought the bull Briar Prince (Brighton Prince-Briar) from Mr. G. T. Chirnside. Three years after this he sold out all his older cattle, retaining only 24 heifers bred from Briar Prince, and these he mated with Linda 13th's Twylish of Kingsvale, bred by and purchased from Mr. Anderson, of Lyndhurst. This bull was replaced after three years' use by another of the same breeding, viz., Linda 2nd's Twylish of Kingsvale, and in due course this bull was replaced by Mystery 8th's Fortune of Melrose, bred by Mr. W. Woodmason, and quite recently a two-year old bull from New South Wales, Redford Stirling, by Matilda's Noble (imp.), has been purchased, and is now at the head of this stud.

Last year Mr. Rowe had in profit thirty-nine cows, including eight two-year old heifers. In November he was milking thirty-two cows, which were grazed on 106 acres. Ten of these cows are being tested under the Government Herd-Testing scheme. He has a further 140 acres, on which thirty-one head of growing stock and five springers were grazing. Twenty-five well-grown calves were running in a small paddock which forms part of the 106 acres mentioned above. Mr. Rowe knows that a good start in life is a big factor towards the success of stock in dairy work, and usually it takes the milk of about three cows to raise each season's calves.

When the accompanying illustrations were taken in November last the whole of the stock were in their usual good working condition, and they show that these Gippsland Jerseys, while fine-boned, are big in body, and have the broad hip with lean thigh and shoulder typical of good dairy stock. Students of the escutcheon theory will also be interested in the horizontal feathering of the cow Tiddlewinks 2nd.

The distance of the farm from rail, and the hilly nature of the country intervening, precludes Mr. Rowe from feeding his dairy herd on purchased fodder to any extent, but his system of cultivating an acre of land for each cow in the herd, and feeding the stock well the whole of the year through, has given him good results. That he has succeeded in carrying Tiddlewinks 2nd through the Government test so as to come out with the record butter-fat production of the year of all breeds competing, is an achievement to be proud of even if he had been on the best of dairying country, but the performance is the more meritorious on a farm situated in such a district as Mt. Eccles, and there is no doubt that Mr. Rowe's success will give much encouragement to many dairy farmers throughout the State.

THE MAKING OF PICKLES, SAUCES, &c.

(*Miss A. Knight, Fruit Preserving Expert.*)

For home use, a collection of pickles, chutneys, sauces, herbs, &c., of which altogether there are quite a number, is perhaps a luxury, but it should not be the rare luxury it is to-day. Many sauces, &c., are inexpensive, and are very useful to season various dishes and make the bill of fare attractive.

There are quite a number of vegetables, fruit, and herbs which are suitable alone or in combination for the making of pickles, chutneys, &c.

The pickles in which the flavour of vinegar predominates are usually spoken of as "sour pickles," and when the sugar or sweetness is more prominent they are called "sweet pickles," or "spiced fruit." These all make excellent preserves, and are useable in several ways. "Mustard pickles" are also a favourite with many, and "chutney" is a preserve well worthy of consideration. "Tomato" sauce, and other thick sauces so much appreciated, may be made with different flavourings, many of which give satisfactory results. The "liquid" sauces include mushroom ketchup, Worcester, &c., while there are quite a number of the aromatized vinegars and dried herbs which will be found very appetising.

Vinegar, with or without the addition of spices or sugar, is used as a temporary preservative in the making of pickles and sauces. Spices, salt, and sugar have somewhat the same effect as vinegar on bacteria, though in a different degree; but they are valuable, apart from their qualities as preservatives, for the flavour they impart.

The following classification of a few commonly known spices and flavouring agents which are frequently used in pickling may be helpful:—

Cloves. Mustard. Cinnamon.	Protective.
Mace. Nutmeg. Pimento or allspice.	Partly or semi-protective, and are valuable for the flavour they impart.
Ginger. Pepper. Cayenne.	To give flavour to the food and to aid digestion.

Turmeric is added to give colour.

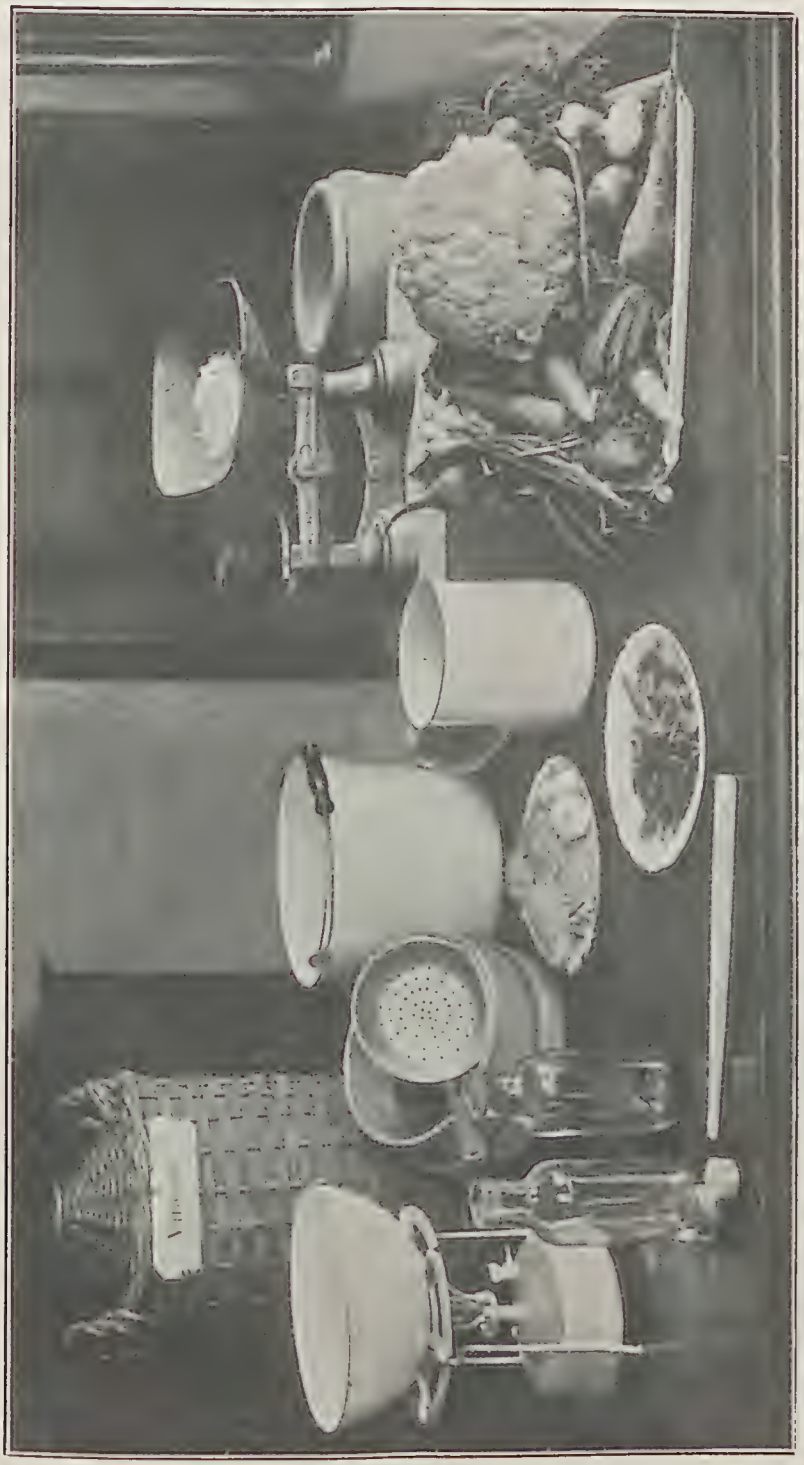
Salt is employed as a preservative, and also as a seasoning.

Horseradish is thought to retard the growth of mould.

Vinegar has also the power of softening the cellulose of green or undeveloped vegetables and fruits, thus rendering some unpromising substances acceptable as condimental foods.

Amongst the vegetables commonly used in pickling are cabbage, tomatoes, cucumber, beets, carrots, beans, cauliflower, onion, &c., also green or unripe fruit and nuts which are tender enough to absorb the vinegar.

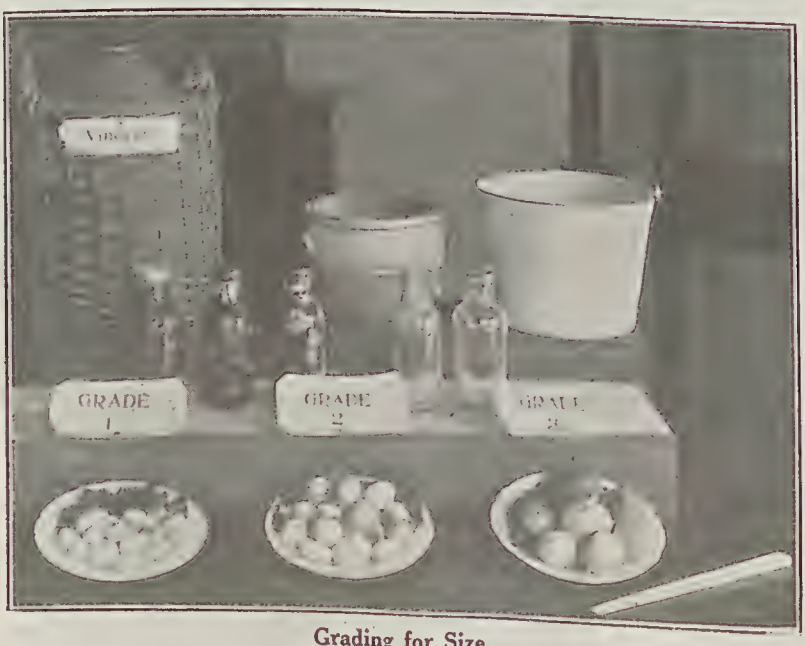
The preliminary preparation of various vegetables differs in some ways. Some are more satisfactory for pickling if first soaked in salted



Preparation Table.

water to extract acrid flavours, others may be lightly sprinkled with dry salt overnight, while some are simply parboiled in salted water. By salting for some hours beforehand in this way, a portion of the water contained in the vegetable is extracted from the tissues, which are then prepared to become absorbed with the spiced vinegar.

Metal utensils should be avoided in pickle-making. Porcelain pans are better for the purpose, and wooden stirring rods and packing sticks are advised, colanders or sieves for draining vegetable from brines are also needed. Clean sterilized glass pickle bottles, or earthenware jars which can be well corked or sealed, are suitable for the purpose of storing the finished product. Pickle-bottle corks may be obtained at a small price, and "chutney" and "sauce" corks of various sizes are on sale, and paraffin, resin, or sealing wax is also procurable at a reasonable figure. A good home-made sealing wax is formed by mixing together equal parts of shoemaker's wax and resin. These should be placed in a clean tin placed in a saucepan of hot water, and, when melted, the corked bottles may be dipped into the liquid.



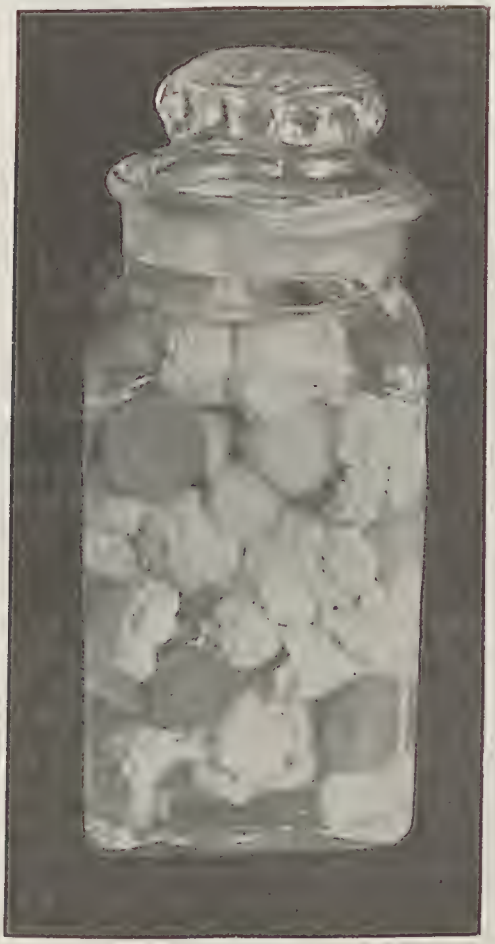
Grading for Size.

Mixed Pickles.

These are a combination of vegetables; those forming the chief ingredients of the mixture may include cauliflower, chillies, white cabbage, small or sliced onion, gherkins, young French beans, melon, green tomatoes, &c.

The preparation of these vegetable will differ slightly; those containing acrid flavours must be soaked in strong brine for a longer period than those free from such flavours. Some need only to be lightly blanched, and others are more satisfactory if parboiled. Such vegetables as cabbage are shredded and every alternate layer liberally sprinkled with salt, and a plate or clean board is put on top, and the

cabbage allowed to remain for about 36 hours; then the water which the salt has extracted from the cabbage should be thoroughly drained off. The cabbage is then ready to be used in a combination of mixed pickles, if necessary. Some vegetables, as French beans, &c., are frequently packed in salt while young, and are cured in this way; the final preparation with vinegar and spices is left until they are required for use. In some cases they are thoroughly freshened in running water to remove salt, when they may be boiled as a fresh vegetable.



Mixed Pickles.

The cauliflower is broken into small sprays, and is sometimes salted as directed for cabbage. Others prefer to blanch the sprays in boiling salted water for a moment (but care must be taken not to soften the cauliflower unnecessarily), then thoroughly drain, and cover with vinegar, and it is ready, when required, for mixing with other vegetables. Onions are sometimes skinned and allowed to soak in brine for about three to four days, the brine being changed once or oftener if desired. They may be then drained and just scalded (below boiling

point); when quite cold, pickling vinegar should be poured over them, and they will be ready for combining with the other vegetables in making mixed pickles. After the necessary preparation of the various kinds of vegetables, they may be mixed as desired, packed into pickle bottles, which should then be filled with the spiced vinegar prepared in the following manner:—

Ingredients required—
- 2 qrts. vinegar.
- 1 cup sugar.
- 3 oz. peppercorns.
- 3 oz. whole ginger.
- 1 oz. allspice or pimento.
- 1 oz. salt.
- 1 oz. cloves.
- 1 clove, garlic.
- 1 tablespoon whole mustard seed.
- ½ teaspoon grated nutmeg.

Bring all to boiling point, then bottle and allow to stand aside for ten to fourteen days to extract flavour, shake the bottle daily. Then strain for use.

Some simply boil for ten to fifteen minutes and strain for use at once. This is a quicker way, but, where time permits, the first-mentioned method (standing and shaking daily for ten to fourteen days) is preferred.

The sugar may be omitted, if desired, and a little grated onion take the place of garlic, and two tablespoonfuls of grated horseradish may be added to the vinegar.

Mixed Mustard Pickle.

This preparation is a favorite with many, the foundation being a mixture of vegetables, such as cauliflower, small onions, celery, green tomatoes, and sections of sliced cucumber, &c. The vegetables, which should be tender, may be cut into convenient shapes and sizes, the onions being peeled, &c. They should all be soaked in strong brine overnight. Next day, drain thoroughly, allow to steep for about twenty minutes in vinegar weakened with water (about equal quantities of vinegar and water), and then bring all to boiling heat in the weak vinegar or in slightly salted water, so that the vegetables may be scalded. Should any vegetable used in the combination be of a hard nature, it is advisable to parboil it separately and then add it to the rest, so as to prevent some being hard while others are overdone. After they have been scalded for about five minutes, they should be well drained on a flat sieve or other convenient article. They are then put into the prepared mustard dressing, heated almost to boiling point, packed into the pickle jars or bottles, and corked and sealed while hot.

Mustard Dressings.

There are many different formulas for these dressings which are in common use. The amount of sugar and of other flavouring agents may be adapted to conditions, but excessive flavours should be avoided,

as also should a mixture of flavours that do not blend. The following is a simple mustard dressing suitable for a mixed mustard pickle:—

Ingredients required—

1 qrt. vinegar.
2 ozs. ground mustard.
1½ to 2 cups sugar.
4 level tablespoons flour.
2 level teaspoons turmeric.

Celery seed (about half a teaspoonful to a quart of vinegar) is also a pleasant addition to the vinegar for flavouring, and, when used, the crushed seed is scalded in the vinegar and strained out before mixing with the dry ingredients.

METHOD OF PREPARATION.

Dissolve the sugar in the vinegar by bringing gradually to boiling point; blend all dry ingredients—mustard, flour, turmeric—in a little of the vinegar which has been allowed to cool off for that purpose. When this is mixed to a perfectly smooth paste in the basin, gradually pour it into the scalding vinegar, stirring the mixture so that an even smooth paste is obtained, then cook for a few moments; add the prepared vegetables, which have been well drained, and when thoroughly heated through, bottle and cork.

Paddling to Remove Air Bubbles.

Red Cabbage.

Select a firm head of red cabbage, remove the coarse outside leaves, and cut the cabbage into four sections, rejecting the centre stalk and heavy ribs in the leaves. Shred finely, and sprinkle every alternate layer of shredded cabbage liberally with salt, and press down with a clean board or plate; allow to stand for from 24 to 36 hours, then thoroughly drain off the water which the salt has drawn from the cabbage, and place the cabbage loosely in the pickle bottle. It will be of a bluish-purple colour, but will turn red on the application of vinegar, and will make an attractive pickle for the table.

The following is a suitable vinegar for red cabbage:—

1 gallon vinegar.
3 ozs. whole pepper.
3 ozs. allspice.
1 lb. of sugar may be added or omitted, according to taste.

The spices may be suspended in a loose muslin bag while scalding, and afterwards removed.

Scald the vinegar, sugar, and spices, then allow to cool, strain and pour over the cabbage, paddle with a narrow packing stick made of white wood, or half a bamboo cane cut down centre will answer very well for the purpose, it having a groove down the stick when halved. The packing stick may be made to any convenient length for handling. The bottle should not be overfilled with cabbage, so that the packing stick can be worked around the contents quickly to displace and remove or send to the surface any air bubbles. The bottles should then be filled right up to the top with the vinegar. The peppercorns may be rejected, or a few divided between the various bottles, which should then be sealed and stored away from the strong light.

Pickled Beets.

The preparation of beets for pickling is slightly different from that of other vegetables.

Select young deep-coloured beets, wash them, being careful to keep the skins intact. Leave the rootlet, crown, and portion of the leaf stems on during the cooking. Put them into boiling water, and cook until almost done (some prefer to bake them in a moderately hot oven instead of boiling), allow to cool, and slip the skins from the roots. Cut them into slices about ½ inch thick, or into such shape or size as will suit the jars; pour the cold spiced vinegar over them, and cork and store.

Beets may also be combined with horseradish for pickling. The vinegar may be spiced as for mixed pickles, or spiced with the following:—

1 qrt. vinegar allow.
1 tablespoon grated horseradish.
½ oz. peppercorns.
½ oz. allspice.

Another seasoning used for beets is coriander seed. To make the flavoured vinegar for the pickling of beets, the following ingredients may be used:—

1 qt. vinegar.
½ oz. coriander seeds.
1 oz. sugar.
About 8 cloves.

Scald together, allow to stand until cool, then drain and pour the beets.

Pickled Gherkins.

Gherkins and cucumbers are also a favorite vegetable for pickling, and there are several ways in which they may be put up. Perhaps one of the most simple is to rub them well with salt and then pack them in salt for two days, moving them about occasionally. Rinse and drain thoroughly, place in a suitable vessel which has been lined

with spinach or vine leaves, the top of the pickle also being covered with the leaves, then pour over them a scalding solution of weak vinegar (about one part vinegar to three parts water), cool quickly, and allow to stand for a few hours, then pour over them a fresh hot vinegar bath a little stronger (two parts vinegar to two parts water), cool, and leave until next day, and then pack into a large-mouthed jar with a few sprigs of thyme, a few bay leaves, peppercorns, a little garlic, and cover them with fresh vinegar which has been brought to boiling heat and allowed to cool, or, if preferred, they may be packed with sweet spiced vinegar.

Cauliflower.

This vegetable may be put up in a clear spiced vinegar, while it also associates well with a mustard sauce or dressing.

Choose firm, white, close, and even flower heads, dividing into even flowerets, and parboil for about five minutes in slightly salted water, thoroughly drain these sections, and pack in a good pickle of vinegar and spices to taste, the vinegar and spices being heated together and allowed to cool before pouring over the cauliflower.

Another method sometimes adopted is to sprinkle the sprays of cauliflower with salt and allow them to stand overnight; next day, rinse, drain, and pack in flavoured vinegar.

Another nice pickle is made as follows:—Salt the sprays overnight, then scald in hot vinegar for a moment, drain thoroughly, and heat up in a good mustard sauce slightly sweetened, bottle while hot, and seal.

Sweet Pickles (Carrot).

Choose bright-coloured and very young carrots of a good shape. The very young carrots sometimes thinned out of the garden plot may be pickled whole, and make an acceptable sweet pickle. Put them into boiling salted water, and cook gently until three parts done, remove them and dip in cold water, slip the skins by gently rubbing, being careful to keep the carrot nice and smooth. Cut them into even slices, pack tightly like sardines, and pour over them a sweet spiced vinegar, made as follows:—

1 qrt. vinegar.
1½ lbs. sugar.
½ oz. cloves.
1 tablespoon cinnamon.
1 teaspoon mace.
1 teaspoon allspice.

Scald together, and strain over the carrots.

Olives.

Care should be taken not to bruise the olives. Grade them, and place in a solution made up as follows to remove bitter taste:—

2 ozs. soda lye.
1 oz. salt.
1 oz. lime.
1 gallon water.

Boil the water and allow it to cool again before mixing this solution, and allow it to stand for an hour before using. The olives must be kept submerged (to prevent discoloration).

When the bitterness has left the fruit, pour off the lye, and cover them with water which should be renewed morning and night. This washing should be continued so long as the fruit has the peculiar hot taste, due to the presence of lye. When the caustic taste has completely left them, the olives are ready for pickling. Some use brine only, at a strength of 2 ozs. salt to 1 gallon water. The brine should be replaced by a salt solution containing 4 ozs. salt to 1 gallon water. Two days later, the strength of the solution is again increased to 6 ozs. salt to 1 gallon water; then, two days later, 8 ozs. to the gallon; two days later again, 10 ozs. to the gallon; and finally the brine should contain 14 ozs. salt to the gallon. Some prefer to process the olives, at a temperature of 180° for 25 minutes after adding the 8-oz. brine, and they should be made airtight while at that heat.

Sweet Spiced Fruit.

Peaches.—Select fruit slightly underipe, pare, and remove the stone, drop the fruit into a boiling syrup, which is made by dissolving 2 lbs. sugar and 1 pint water, and which should be skimmed as it boils. The fruit should be heated thoroughly right through (about five or eight minutes), removed from the fire, cooled off quickly, and allowed to stand in the syrup for about two or three hours. The syrup is then drained from the fruit, and the following ingredients added to it and boiled with it for about fifteen minutes:—

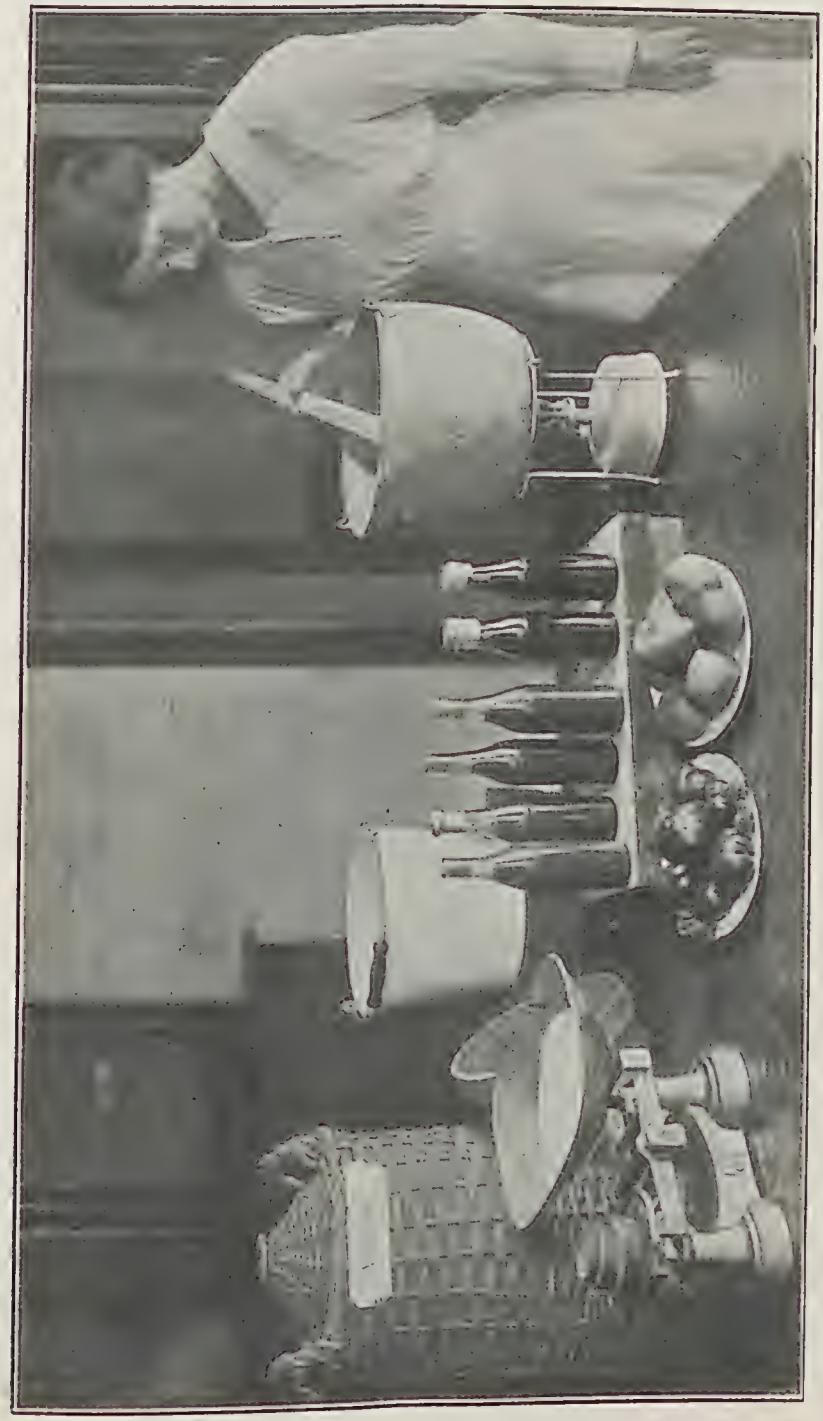
1 pint vinegar.
2 ozs. stick cinnamon.
1 oz. root ginger.
2 or 3 blades of mace.
1 oz. cloves.

Put the fruit into this, and again simmer for from eight to ten minutes, or until the peaches are clear, then pack into the jar, pour the spiced syrup over them, and cork.

Other fruit may be spiced in a similar way. Damsons are amongst the fruits favoured for this purpose, and make a pleasant sweet pickle with the following treatment. The fruit selected should be firm, sound, and not at all overripe:—

For about 6 lbs. damsons allow—
3 lbs. sugar.
1 pint vinegar.
1 teaspoon cloves.
1 or 2 ozs. root ginger.
2 or 3 blades of mace.
1 teaspoon allspice berries.
1 teaspoon peppercorns.

Method.—Sprinkle about half the amount of sugar over the fruit (which should have been previously washed and well drained and slightly pricked), and allow it to stand for some hours. Make a syrup of the vinegar and remaining portion of the sugar, and add other ingredients; when this is prepared by boiling together for a few moments, cool it down, then add the plums and juice, heat together (keeping just below boiling point) for about five or eight minutes, then lift the fruit carefully out of the syrup with a perforated skimmer, and pack into pickle jars; bring the syrup to boiling heat, and pour over the fruit, process for about ten minutes at 180° Fahr., and seal.



Chutney Making.

Various kinds of fruits may be treated in a similar manner, when other palatable spices may be substituted in quantities as desired, according to the particular variety of fruit under treatment.

Chutney.

Chutney is a well-known relish, which appears to be of East Indian origin. Fruit pulps and certain vegetables may be used as a basis for this preparation, and these may be supplemented by the addition of salt, sugar, vinegar, and spices; raisins also enter into the composition of this particular preserve. Such fruits as apples, tomatoes, persimmons, pears, mangoes, and guavas are suitable foundation; while chillies, ginger, garlic, or other piquent flavourings may be added to suit the taste. Some palates prefer much more highly spiced and sweetened foods than others, and it is a safe rule to season moderately, blending all ingredients well together. All the ingredients should be cooked until the mixture has the appearance and consistency of a solid sauce.

Chutneys may be served with cold meats, sausages, curries, &c. The following is one in which apples and tomatoes form the foundation:—

Fruit Chutney.

4 lbs. apples.
3 lbs. tomatoes.
2 lbs. ripe William pears.
4 lbs. brown sugar.
2 tablespoons treacle.
1½ tablespoons cloves.
1½ tablespoons whole pepper.
1½ tablespoons allspice.
1½ tablespoons ground ginger.
1 tablespoon mace.
¼ teaspoon cayenne.
¾ lbs. stoned raisins.
2 qrts. vinegar.

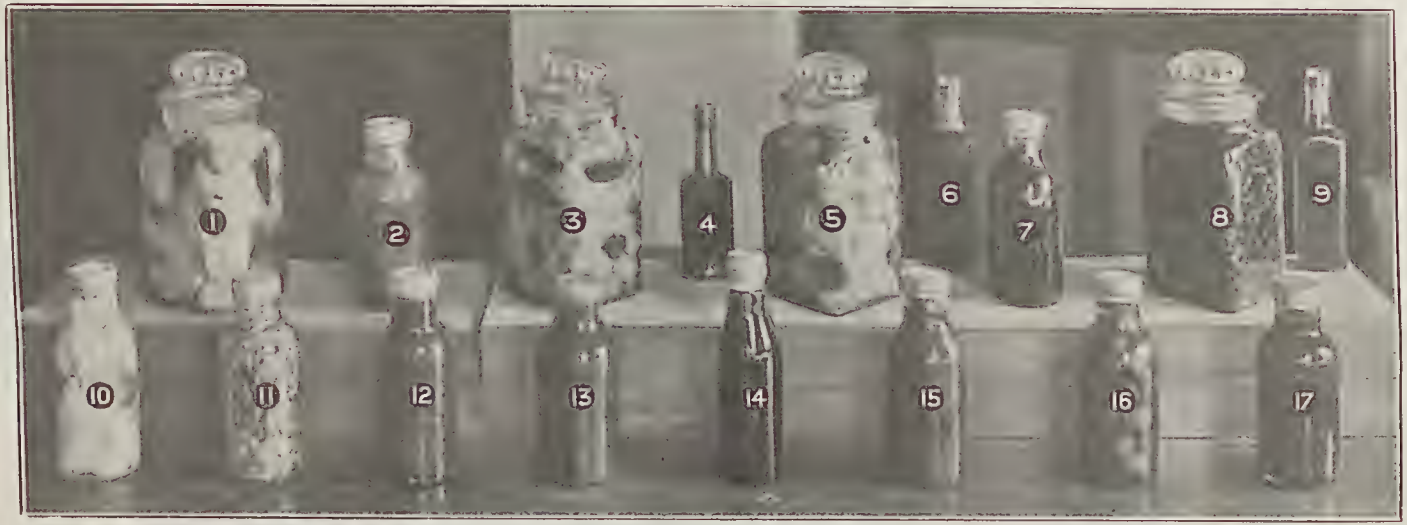
Method.—Boil together until all ingredients are well blended and colour and consistency right.

Ketchup and Sauces.

Of these, there are thin liquid sauces, as mushroom ketchup, walnut ketchup, Worcester sauce, and such preparations; while the thicker varieties consist of "tomato" sauce and other thick substances, which may be made from fruits and various foundations flavoured accordingly. The tomato is a general favorite, and, while the ingredients may be varied to give a "mild" or "hot" result, the following is a medium:—

Tomato Sauce.

Take a quantity of tomatoes, say, about 20 lbs., pulp the tomatoes by boiling rapidly until quite soft (no water should be added, but the tomatoes should be slightly crushed to commence the boiling). Pass



Collection of Pickles and Sauces.

1. Cauliflower and Onion Pickles.
2. Mustard Pickles.
3. Cauliflower and Gherkin Pickles.
4. Mushroom and Ketchup Pickles.
5. Cauliflower, Carrot, and Olive Pickles.
6. Aromatized Vinegar.
7. Beetroot.
8. Red Cabbage.
9. Tomato Sauce.
10. Cauliflower and Carrot.
11. White Cabbage and Celery.
12. Green Tomato Pickle.
13. Tomato (Mustard dressing).
14. Fruit Chutney.
15. Spiced Fruit.
16. Pickled Onions.
17. Spiced Red Cabbage.

the pulp through a sieve which will retain only the seeds and skins, then measure the strained pulp, and to each gallon of this allow—

4 ozs. salt.
1½ lbs. sugar.
1½ ozs. garlic.
1 oz. allspice.
1 oz. cloves.
1 tablespoon mustard.
½ teaspoon cayenne.
1 qrt. good vinegar.

The whole spices may be suspended in a loose muslin bag while being boiled, and removed at finishing point.

The sauce is then boiled until of a right consistency, which may be tested by placing a little of the hot sauce on a plate, and if no watery liquid separates from the solid sauce, it is ready for bottling off into hot sterilized sauce bottles, and, when bottled, should be cooled off at once.

MUSHROOM KETCHUP.

Mushroom ketchup is one which is much liked for flavouring soups, &c., and is the juice of mushrooms which exudes when they are kept salted in layers for three or four days, the juice is then strained out and boiled up with a little cayenne, thyme, bay leaf, &c., and is afterwards bottled and corked.

WALNUT KETCHUP.

This popular relish is made by pickling young green walnuts in vinegar and salt for eight or ten days. The liquid is then expressed and boiled up with spices, such as ginger, cloves, nutmegs, mace, and such flavourings as shallots, garlic, and horseradish, and is allowed to macerate a short time before using.

Both mushroom and walnut ketchup enter largely into the preparation of other sauces or relishes which consist of a basis of vinegar, cayenne pepper, allspice, garlic, and other condiments. One of the kind is composed as follows:—

2 qrts. malt vinegar.
4 tablespoons essence anchovy.
6 tablespoons walnut ketchup.
4 tablespoons soy.
½ level teaspoon of cayenne pepper.
2 cloves of garlic finely chopped.

Put all into a bottle, cork, and shake the mixture often for about two weeks, then strain into smaller bottles, and cork tightly.

Another is made up as follows:—

1 qrt. vinegar.
½ pint mushroom ketchup.
½ pint treacle.
1 lemon.
½ oz. cayenne.
½ oz. cloves.
½ oz. ginger.
½ oz. garlic.
½ oz. salt.

Bring the vinegar to boiling point, and allow to cool, and add other ingredients; put all into a large bottle and shake daily for eight or ten days, then strain and bottle.

THE DRYING OF HERBS.

Many housewives draw a supply of culinary herbs from their own garden, where they require very little attention in their cultivation. A small plot of ground would probably yield sufficient to meet requirements right through the year if in times of plenty the surplus were preserved by drying, when they could be stored away in corked bottles, either separately or in a mixed form, and would be of supreme service in the kitchen when the fresh ones were not obtainable.

To dry the herbs for culinary use, they should be gathered on a dry day, and after the morning dew has disappeared. They are usually gathered just before the flowering stage. Cleanse them quickly and remove any decayed leaves, and spread on a clean sieve or tray of wire mesh, or on stretched cotton cloth, such as cheesecloth, and place in the sunlight, or they may be dried successfully by artificial heat by placing them on the oven sheet and leaving the oven door slightly open. The heat must not be too great, but should be sufficient to dry quickly, so that the colour and flavour will be protected. The leaves should afterwards be separated from the stalks and passed through a sieve, when they are ready for storing in clean dry bottles, which should be kept corked, as herbs lose their aroma and strength by exposure. Each variety may be bottled separately, or may be blended, in suitable mixtures, with or without the addition of spices, and are then in readiness for use when required. They will be found serviceable for the purpose of imparting a nice flavour to savoury pies, pasties, brawn, and forcemeats; some varieties being suitable for soups; others for seasonings, gravies, mince, stuffings, &c. The following mixture, which is sometimes put up in the one bottle, consists of—

½ oz. lemon thyme.
½ oz. marjoram.
⅓ oz. basil.
⅓ oz. savory.
¼ teaspoon grated nutmeg.
⅛ teaspoon cayenne.
2 bay leaves.
1 blade mace.

Pound together and pass through a sieve, then bottle and cork. Another seasoning is made by blending in the same manner—

¼ oz. dried thyme leaves.
¼ oz. marjoram.
¼ oz. savory.
About ⅛ oz. of cayenne pepper.
½ oz. nutmeg.
½ oz. ground cloves.

Pound together, and, when reduced to a powder, pass through a sieve, bottle, and keep corked as herbs.

Parsley.—Parsley may be preserved by drying in the same manner as other herbs. Another method is to wash it free from sand, and, after removing the coarser stalks, dip into boiling water which is slightly salted. Just scald in this way for a couple of moments, drain and shake it free from water, then dry as other herbs. This method of drying is usually adopted when the parsley is needed for garnishing purposes. It should, of course, be stored in corked bottles, so that the small sprays of parsley may be used as desired. When wanted for use, just soak in warm water for a few moments.

AROMATIZED VINEGARS.

These are also useful preparations to have ready prepared, and may be used to advantage in various dressings which are to be served with salads, and for fish sauces, &c., and by their use a new flavour is easily obtainable to a sauce or dressing.

The tarragon, celery, and onion vinegars are much appreciated.

Tarragon Vinegar.—Vinegar is aromatized easily with tarragon by allowing one cupful of the herb to steep in a quart of vinegar for ten to twelve days, then strain the liquid through a clean fine muslin strainer, bottle, and cork for future use.

Shallot Vinegar.—Remove the skins and chop the shallots finely, cover them with vinegar, and infuse for a few days, shake the bottle occasionally; afterwards strain and bottle the vinegar, keeping it well corked. Finely chopped Spanish onion may be used in place of the shallots, if preferred, as follows:—

Onion Vinegar—

to ½ cup chopped onion.
1 qrt. vinegar.
1 teaspoon salt.
2 teaspoon sugar.

Celery Vinegar—

Take about 1 lb. chopped celery.
½ oz. celery seed (crushed).
1 teaspoon salt.
2 teaspoon sugar.
1 qrt. vinegar.

The vinegar is heated with the celery seed, salt, and sugar, and poured over the chopped celery and allowed to cool, then put into a large bottle. Shake daily for ten to fourteen days, then strain and bottle, and cork.

Horseradish Vinegar—

Take about 1 breakfastcupful of grated horseradish (if desired it may be passed through a mincer).
1 rounded tablespoon white sugar.
1 qrt. cider or white wine vinegar.

Scald the vinegar and pour over the horseradish, allow to steep for seven to ten days, then strain and bottle.

"TOPPING OFF" POULTRY.

By A. V. D. Rintoul, N.D.D., Assistant Poultry Expert.

The practice of "topping off" poultry prior to marketing for table purposes has never been developed in Australia to any extent, though in many places in Europe it is an industry by itself. The two principal reasons for this are, first, the higher pre-war cost of labour, combined with a lack of experienced men, and second, apart from the added weight for the bird, the Australian public has not yet shown any marked anxiety to pay higher prices per pound for improved quality, which would be essential to make the machine cramming part of the business a success.

In Great Britain the men engaged in the industry are not breeders themselves, but rely for their supplies upon farmers, cottagers, &c., supplies being brought in from round the countryside in carts; sometimes the collectors are in the direct employ of the "fatteners," but more generally are working on their own account. These men are known as "higglers," and have to be keen judges of a bird, and be quite conversant with market prices, the point being that the birds must be bought at a price that will show a profit on the market, after the fattening process, which usually requires about three weeks, has been completed.

As there is fairly keen competition to get suitable birds, the price paid must be a fair one, and the "higgler" is usually content with 1d. per bird for collection, the fattening establishment generally netting an average of 3d. to 4d. per bird. This may seem a very small profit, but a big establishment can deal with up to 100,000 birds annually.

For fattening, the birds are placed in cages which are generally about 6 ft. 6 in. long and 18 inches deep, divided into three compartments, each containing five or six birds. Birds are never kept singly in cages; this system has been out of date for twenty years. They do not fatten so well in solitary confinement as when there is competition for food.

No food is fed for the first twenty-four hours, the object of this apparently peculiar method of initiating the fattening process being to make the birds forget their loss of liberty in their anxiety for food! The birds are kept in semi-darkness, and given only soft food of about the consistency of porridge. This is fed to them twice a day, and they are given as much as they can eat up in about quarter of an hour; after that time any that is left over is removed.

Generally speaking the birds are fed only once on Sundays; otherwise the trough system of feeding goes on for ten or eleven days, after which the finishing-off process of cramming, by means of a machine, lasts for another ten days. For this, the consistency of the food is thinner, and a little mutton fat is generally added. The machine is fitted with a long leather tube which passes down the bird's throat and into the crop. The bird is held under one arm, the hand stretching out the neck and opening the beak, the tube is then passed over the tongue down into the crop; the other hand is held over the crop so as to determine when it is comfortably filled. The foot of the operator works a lever which causes the food to be driven down the tube. A

capable man will manage 220 to 250 birds in an hour. Birds found to have food in their crops when the crammer goes round are not given anything until the next meal.

The French method of holding the bird is somewhat different, and while it undoubtedly tends to faster work, it is not, in the writer's opinion, as accurate as the British method. Two other methods of fattening birds are common amongst the French peasantry, and achieve similar results. One is to hold the bird between the knees, put a tube down its throat, and pour the food down the tube from a jug. The other method is to mix the food a little firmer, into a number of small "cartridges," and having dipped one in milk, stroke it down the throat into the crop. Enough of these "cartridges" are given to fill the crop. These two systems are undoubtedly slow, but are practiced by the humble toilers, who can better afford a little extra time for the work than the 150 or 200 francs required to purchase a proper cramming machine.

The average increase in weight for the cockerels is from 1½ to 1¾ lbs. during the trough feeding period, with an additional half to three-quarters of a pound for the cramming period; but this extra half pound or so increase in weight is supplemented by a very marked improvement in the quality of the flesh.

The food used is largely ground oats, mixed with sour skim milk. The general practice was to import Russian oats for the purpose, as they were thinner skinned and contained less moisture. For economy ground oats, maize meal, and barley meal are sometimes used mixed, and in France buckwheat meal and barley meal. The most important feature is the sour skim or separated milk, without which the results are not nearly as good. A little fat is mixed in with the food during the last few days to still further improve quality and whiteness of flesh.

For the Paris market the birds are always packed back up, not breast upwards, in order that the extra amount of flesh along the back may be shown. A proportion of these birds come from the Houdan market, where from 6,000 to 10,000 birds are marketed every Wednesday, practically every bird being a Faverolles.

The terms used in the London market such as Surrey or Sussex fowls do not in any way indicate the actual breed (there is no such breed as "Surrey"), but merely indicate the origin and the pack. Irish fowls as such bring the lowest price on the London market, hence at times they are consigned to addresses in Surrey or Sussex, re-packed and way-billed, and then fetch higher prices than those consigned direct from Ireland.

The birds are always starved twenty-four hours before being killed, so as to void the intestines. The rich manure from the fattening pens is saved and bagged, and is much sought after by those who raise early tomatoes under glass.

Though the system of "topping off" described appears to be cruel, the fact that birds thrive under it shows that it is not so. There is very little doubt that the trough feeding of birds for the Melbourne market would prove highly remunerative, and though the process of machine cramming is not at present recommended it has been worked successfully in the past by the late M. Mazarin.

LIST OF FERTILIZERS REGISTERED UNDER THE FERTILIZERS ACT FOR THE YEAR 1920.

P. Rankin Scott, Chemist for Agriculture.

DEFINITION OF A FERTILIZER.

A fertilizer is any material containing nitrogen, phosphoric acid, or potash which has been manufactured, produced, or prepared in any way for the purpose of fertilizing the soil or supplying nutriment to the plant.

REGISTRATION OF BRANDS.

All manufacturers and importers who desire to have a brand registered in respect of any fertilizer shall, on or before the 1st day of November in each year, make application to the Director of Agriculture for the registration of such brand.

When making application, the applicant is required to state the full name and address of place of business, the figure, trade mark, or sign to be associated with the fertilizer to identify it, a statement of the precentage composition of the fertilizer in respect of its nitrogen, phosphoric acid, and potash, showing the form in which they occur, and the retail price of the fertilizer. Tables of brands registered appear on pages

UNIT VALUES.

From the composition of the fertilizer as set forth in the registration of brands, and taking into account the constituents that have a commercial value, and the value thereof in the simple fertilizers in which they occur, the average unit value of such constituents are calculated. The unit value so arrived at constitutes the basis for calculating the commercial value of all fertilizers for the period during which the registered brands continue in force. A ready and simple means is thus offered the buyer of determining the value of a fertilizer. Hereunder is a table of unit values for the year 1920:—

	Value per Unit £	s.	d.
Nitrogen, as Nitrate	1	15	6
" Ammonia	0	19	0
" Blood	1	1	0
" Bone and Blood	0	19	0
" Bone and Flesh	0	19	0
" in Fine Bone	0	19	0
" in Coarse Bone	0	17	0
" unspecified	0	17	0
Phosphoric Acid, as Water Soluble	0	6	3
" " Citrate Soluble	0	6	0
" " Citrate Insoluble in Superphosphate	0	1	0
" " " " Nitro Super	0	1	0
" " " " Basic Phosphate	0	1	0
" " " " Market Garden Manure	0	1	0
" " " " Bone and Super	0	4	0
" " " " Super and Bone	0	4	0
" " " " Bone Fertilizer	0	4	0
" " " " Roasted and intensely ground Phosphate	0	4	3
" " " " Ground Rock Phosphate	0	3	0
" " " "	0	5	0
" " in Fine Bone	0	4	3
" " in Coarse Bone	0	9	5
Potash, as Soluble Salts			

METHOD OF CALCULATION.

Two fertilizers in popular favour are taken as typical examples, viz., Superphosphate and Bonedust.

SUPERPHOSPHATE.

Composition Shown on Tag.		Unit Value.		Value Per Ton.		
		s.	*d.*	£	*s.*	*d.*
Water Soluble Phosphoric Acid ..	17.00% ×	6	3 =	5	6	3
Citrate Soluble Phosphoric Acid ..	0.50% ×	6	0 =	0	3	0
Citrate Insoluble Phosphoric Acid	0.50% ×	1	0 =	0	0	6
Total				5	9	9

BONEDUST.

Composition Shown on Tag.

Nitrogen	3.86%
Phosphoric Acid	23.25%
As Fine Bone	33.70%
As Coarse Bone	66.30%

In this case it is first necessary to find the proportion of nitrogen and phosphoric acid in the fine and coarse bone.

		Fine.	Coarse.
Nitrogen	3.86% × 33.70 =	1.30 to	2.56%
Phosphoric Acid ..	23.25% × 33.70 =	7.83 to	15.42%

Composition as Found.		Unit Value.		Price Per Ton.		
		s.	*d.*	£	*s.*	*d.*
Nitrogen as fine bone	1.30% ×	19	0 ..	1	4	8
Nitrogen as coarse bone ..	2.56% ×	17	0 ..	2	3	6
Phosphoric Acid as fine bone ..	7.83% ×	5	0 ..	1	19	2
Phosphoric Acid as coarse bone ..	15.42% ×	4	3 ..	3	6	4
				£8	13	8

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1920.

FERTILIZERS MAINLY NITROGENOUS.

Description of Fertilizer.	Brand.	Nitrogen.				Phosphoric Acid.	Potash.	Price asked for the Fertilizer per ton.	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	Total.				
		%	%	%	%	%	%	£ s. d.	
Nitrate of Soda ..	Federal S.N. ..	15·50	..	..	15·50	..	..	27 10 0	The Australian Explosives and Chemical Co. Ltd., 135 William-street, Melbourne
,, ,, ..	Sickle	15·50	..	..	15·50	..	..	27 10 0	Cuming, Smith and Co. Pty. Ltd., 65 William-street, Melbourne
,, ,, ..	M.L.	15·50	..	..	15·50	..	..	27 10 0	The Mount Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ..	Wischer and Co. Pty. Ltd.	15·50	..	..	15·50	..	..	27 10 0	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
Sulphate of Ammonia ..	B.G. Co.	..	20·88	..	20·88	..	..	18 0 0	Ballarat Gas Co., Grenville-street, Ballarat
,, ,, ..	C.G.A.F. ..	..	20·59	..	20·59	..	..	18 0 0	The Colonial Gas Association Ltd., Whitehall-street, Footscray
,, ,, ..	M.G. Co... ..	..	20·59	..	20·59	..	..	18 0 0	The Metropolitan Gas Company, 196 Flinders-street, Melbourne
,, ,, ..	Federal A.S. ..	..	20·00	..	20·00	..	..	20 0 0	The Australian Explosives and Chemical Co. Ltd., 135 William-street, Melbourne
,, ,, ..	Sickle	..	20·00	..	20·00	..	..	20 0 0	Cuming, Smith and Co. Pty. Ltd., 65 William-street, Melbourne
,, ,, ..	M.L.	..	20·00	..	20·00	..	..	20 0 0	The Mount Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ..	Wischer and Co. Pty. Ltd.	..	20·00	..	20·00	..	..	20 0 0	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
Blood Manure	M.C.C.	..	..	7.76	7·76	1·22	0·38	7 0 0	The Melbourne City Council City Desiccating Works, Smithfield-road, Kensington
,, ...	F.E.X.	..	..	7·50	7·50	1·20	..	8 8 0	H. C. Pannifex, 22 Market-street, Melbourne
Dried Blood	P.	..	..	9.50	9·50	0·50	..	15 0 0	H. C. Pannifex, 22 Market-street, Melbourne
,, ...	Bendigo Rohs ..	..	..	9.50	9·50	..	..	11 10 0	P. Rohs Pty. Ltd., Bridge-street, Bendigo
,, ...	Mount Clear ..	..	..	11.45	11·45	..	..	12 10 0	Bailey Bros. and Co., Mount Clear, *via* Ballarat
,, ...	S.C.	..	..	9.89	9·89	1.59	..	8 15 0	Sims, Cooper and Co. (Aust.) Pty. Ltd., "The Olderfleet," Collins-street, Melbourne
	D. B.								
Blood Manure	Champion ..	..	..	12.25	12·25	1.40	..	Not retailed	John Cooke and Co. Pty. Ltd., 534 Collins-street, Melbourne
*Castor Meal	"Alba"	..	..	..	3·50	..	..	3 0 0	Lycett Pty. Ltd., Normanby-road, Montague, Melbourne

* The nitrogen here is unspecified.

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1920—*continued*.

FERTILIZERS MAINLY PHOSPHATIC, READILY SOLUBLE.

Description of Fertilizer.	Brand.	Phosphoric Acid.				Price asked for the Fertilizer per ton.	Where Obtainable.
		As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.		
		%	%	%	%	£ s. d.	
Superphosphate ..	Federal O.S. ..	17·00	0·50	0·50	18·00	5 10 0	Australian Explosives and Chemical Co. Ltd., 135 William-street, Melbourne
„	Sickle Florida ..	17·00	0·50	0·50	18·00	5 10 0	Cuming, Smith and Co. Pty. Ltd., 65 William-street, Melbourne
„	M.L. No. 1 ..	17·00	0·50	0·50	18·00	5 10 0	The Mount Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
„	Wischer and Co. No. 1	17·00	0·50	0·50	18·00	5 10 0	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
„	Hasell's	17·00	0·50	0·50	18·00	5 10 0	Arthur H. Hasell, 17 Queen-street, Melbourne
„	Bendigo Rohs ..	16·50	0·50	0·50	17·50	5 15 0	P. Rohs Pty. Ltd., Bendigo Bone Mills, Bendigo East
„	J. Cockbill ..	17·00	0·50	0·50	18·00	5 10 0	J. Cockbill, 407 Post Office-place, Melbourne
Moderately Soluble.							
Basic Phosphate ..	Federal B.P. ..	..	14·00	3·00	17·00	5 0 0	Australian Explosives and Chemical Co. Ltd., 135 William-street, Melbourne
„ „ ..	Sickle	..	14·00	3·00	17·00	5 0 0	Cuming, Smith and Co. Pty. Ltd., 65 William-street, Melbourne
„ „ ..	M.L.	..	14·00	3·00	17·00	5 0 0	The Mount Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
„ „ ..	Wischer and Co. Pty. Ltd.	..	14·00	3·00	17·00	5 0 0	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
Difficult Soluble.							
Ground Phosphate ..	Federal G.P. ..	..	..	36·65	36·65	5 10 0	Australian Explosives and Chemical Co. Ltd., 135 William-street, Melbourne
„ „ ..	Sickle 80 % ..	..	..	36·65	36·65	5 10 0	Cuming, Smith and Co. Pty. Ltd., 65 William-street, Melbourne
„ „ ..	Sickle 60 % ..	..	..	27·50	27·50	4 10 0	Cuming, Smith and Co. Pty. Ltd., 65 William-street, Melbourne
„ „ ..	Sickle 50 % ..	..	..	23·00	23·00	3 17 6	Cuming, Smith and Co. Pty. Ltd., 65 William-street, Melbourne
„ „ ..	M.L. 80 % ..	..	..	36·65	36·65	5 10 0	The Mount Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1920—*continued*.

FERTILIZERS MAINLY PHOSPHATIC, READILY SOLUBLE.

Description of Fertilizer.	Brand.	Phosphoric Acid.				Price asked for the Fertilizer per ton.	Where Obtainable.
		As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.		
Difficult Soluble—continued.						£ s. d.	
Ground Phosphate ..	M.L. 60 % ..	..	..	27·50	27·50	4 10 0	The Mount Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
„ „ ..	M.L. 50 % ..	..	..	23·00	23·00	3 17 6	The Mount Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
„ „ ..	Wischer and Co. Pty. Ltd., 80 %	..	..	36·65	36·65	5 10 0	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
„ „ ..	Wischer and Co. Pty. Ltd., 60 %	..	..	27·50	27·50	4 10 0	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
„ „ ..	Wischer and Co. Pty. Ltd., 50 %	..	..	23·00	23·00	3 17 6	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
„ „ ..	Hasell's Marion, 60%	..	..	27·50	27·50	4 10 0	Arthur H. Hasell, 17 Queen-street, Melbourne
„ „ ..	Victoria No. 3 ..	..	..	14·00	14·00	2 2 0	The Phosphate Co-operative Company of Australia Ltd., 545 Little Collins-street, Melbourne
„ „ ..	Victoria No. 4 ..	..	..	11·00	11·00	1 14 0	The Phosphate Co-operative Company of Australia Ltd,. 545 Little Collins-street, Melbourne
Roasted and Intensely Ground *Guano	Victoria Phosphate	..	3·00	12·00	15·00	3 8 6	The Phosphate Co-operative Company of Australia Ltd., 545 Little Collins-street. Melbourne
	Mt. Etna.. ..	..	..	12·00	12·00	7 10 0	Joseph Morrison Stearns, No. 4 St. James' Buildings, William-street, Melbourne

* This guano also contains—Nitrogen, 0.15; Potash, 0·50.

FERTILIZERS CONTAINING NITROGEN AND PHOSPHORIC ACID, READILY SOLUBLE.

Description of Fertilizer.	Brand.	Nitrogen.			Phosphoric Acid.				Price asked for the Fertilizer per ton.	Where Obtainable.
		As Ammonia.	As Blood Bone and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.		
		%	%	%	%	%	%	%	£ s. d.	
Nitro Superphosphate	Federal T.D. ..	1·55	..	1·55	15·30	0·45	0·45	16·20	6 15 0	Australian Explosives and Chemical Co. Ltd., 135 William-street, Melbourne
„ „ ..	Sickle T.D. ..	1·55	..	1·55	15·30	0·45	0·45	16·20	6 15 0	Cuming, Smith and Co. Pty. Ltd., 65 William-street, Melbourne

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1920—*continued.*

FERTILIZERS CONTAINING NITROGEN AND PHOSPHORIC ACID, READILY SOLUBLE.

Description of Fertilizer.	Brand.	Nitrogen.			Phosphoric Acid.				Price asked for the Fertilizer per ton.	Where Obtainable.
		As Ammonia.	As Blood Bone and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.		
		%	%	%	%	%	%	%	£ s. d.	
Nitro Superphosphate	M.L. (top dressing for grass)	1·55	..	1·55	15·30	0·45	0·45	16·20	6 15 0	The Mount Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ..	Wischer and Co. Pty. Ltd. (top dressing manure)	1·55	..	1·55	15·30	0·45	0·45	16·20	6 15 0	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
,, ,, ..	Federal N.S. ..	1·50	0·50	2·00	13·18	0·38	1·71	15·27	6 15 0	Australian Chemical and Explosives Co. Ltd., 135 William-street, Melbourne
,, ...	Sickle ..	1·50	0·50	2·00	13·00	0·39	1·61	15·00	6 15 0	Cuming, Smith and Co. Pty. Ltd., 65 William-street, Melbourne
,, ,, ..	M.L. ..	1·50	0·50	2·00	13·00	0·38	1·37	14·75	6 15 0	The Mount Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ..	Wischer and Co. Pty. Ltd.	1·50	0·50	2·00	13·00	0·39	1·61	15·00	6 15 0	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
Moderately Soluble.										
Super and Bone ..	Federal B.S. No. 3	..	0·75	0·75	12·75	1·13	3·62	17·50	6 0 0	Australian Explosives and Chemical Co. Ltd., 135 William-street, Melbourne
,, ,, ..	Sickle (C) ..	..	0·75	0·75	12·75	1·37	3·38	17·50	6 0 0	Cuming, Smith and Co. Pty. Ltd., 65 William-street, Melbourne
,, ,, ..	M.L. No. 2 ..	..	0·75	0·75	12·75	1·38	3·37	17·50	6 0 0	The Mount Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ..	Wischer and Co. Pty. Ltd., No. 2	..	0·75	0·75	12·75	1·37	3·38	17·50	6 0 0	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
Bone Fertilizer and Superphosphate	Elsworths ..	..	1·50	1·50	9·00	2·50	5·00	16·50	6 10 0	William Elsworth, corner of York and Joseph streets, Ballarat East
Bone and Superphate	Gardiner's ..	..	1·39	1·39	8·00	3·20	5·80	17·00	6 17 6	George Gardiner and Co. Pty. Ltd., Marshall, Geelong
Blood, Bonedust, and Superphosphate	Bendigo Rohs ..	..	4·00	4·00	5·50	6·25	2·25	14·00	8 15 0	P. Rohs Pty. Ltd., Bendigo Bone Mills, Bendigo East
Bonedust and Super	Bendigo Rohs ..	..	1·50	1·50	8·50	5·25	4·25	18·00	7 10 0	P. Rohs Pty. Ltd. Bendigo Bone Mills, Bendigo East
Super and Bone ..	Cockbill's ..	..	0·75	0·75	12·75	1·38	3·37	17·50	6 0 0	W. and J. Cockbill, jun., trading as J. Cockbill, 407 Post Office-place, Melbourne
Market Garden ..	Federal M.G. ..	1·50	2·50	4·00	7·22	1·79	2·99	12·00	7 12 6	Australian Explosives and Chemical Co. Ltd., 135 William-street, Melbourne
,, ,, ..	Sickle ..	1·50	2·50	4·00	7·22	1·79	2·99	12·00	7 12 6	Cuming, Smith and Co. Pty. Ltd., 65 William-street, Melbourne
,, ,,	M.L.	1·50	2·50	4·00	7·22	1·79	2·99	12·00	7 12 6	The Mount Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ..	Wischer and Co. Pty. Ltd.	1·50	2·50	4·00	7·22	1·79	2·99	12·00	7 12 6	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne

List of Fertilizers Registered at the Office of the Director of Agriculture under the Fertilizers Act 1915 (No. 2652) for the Year 1920—*continued.*

High Grade, containing Nitrogen and Phosphoric Acid, moderately Soluble.

Description of Fertilizer.	Brand.	Nitrogen.		Phosphoric Acid.				Price asked for the Fertilizer per ton.	Where Obtainable.
		Bone and Blood	Bone and Flesh.	Water Soluble.	Citrate Soluble	Citrate Insoluble.	Total.		
		%	%	%	%	%	%	£ s. d.	
Bone and Blood ..	Lighthouse ...	5·50	..	..	3·00	9·00	12·00	8 0 0	Thos. Borthwick and Sons (A'asia) Ltd., 84 William-street, Melbourne
Blood and Bone ..	Brooklyn ..	5·50	..	..	4·50	11·50	16·00	8 15 0	Thos. Borthwick and Sons (A'asia) Ltd., 84 William-street, Melbourne
Bone Manure ..	Cockbill's ..	..	6·00	..	5·00	10·00	15·00	8 10 0	W. and J. Cockbill, jun., trading as J. Cockbill, 407 Post Office-place, Melbourne
Bone and Blood ..	Gardiner's Magic Fertilizer Special	5·00	..	..	3·00	10·00	13·00	7 10 0	George Gardiner and Co. Pty. Ltd., Marshall, Geelong
Blood and Bone ..	G.D.	5·56	..	..	5·45	3·02	8·47	8 5 0	Gippsland Co-operative Bacon Curing Company Ltd., Dandenong
Bone and Blood ..	Hasell's ..	7·18	..	..	5·08	5·00	10·08	11 10 0	Arthur H. Hasell, 17 Queen-street, Melbourne
Blood and Bone ..	W.I.F.C.O. ..	7·93	..	..	4·21	6·31	10·52	8 0 0	The Wimmera Inland Freezing Co. Ltd., Murtoa
,, ,, ..	H.C.P. ..	5·00	..	..	4·75	5·25	10·00	10 10 0	H. C. Pannifex, 22 Market-street, Melbourne
Blood and Bonedust	Rohs ..	6·00	..	..	3·00	6·00	9·00	10 0 0	P. Rohs Pty. Ltd., Bendigo Bone Mills, Bendigo East
Bone and Blood ..	S.C. ..	4·95	..	..	5·07	11·11	16·18	8 15 0	Sims, Cooper and Co. (Aust.) Pty. Ltd., "The Olderfleet," Collins-street, Melbourne
Blood and Bone ..	B. B. Champion Animal Fertilizer	6·00	..	..	7·75	4·25	12·00	Not retailed	John Cooke and Co. Pty. Ltd., 534 Collins-street, Melbourne
Low Grade.									
Bone Fertilizer ..	Cockbill's ..	..	3·50	..	3·50	14·75	18·25	7 0 0	W. and J. Cockbill, jun., trading as J. Cockbill, 407 Post Office-place, Melbourne
Fertilizer	Elsworth's ..	..	3·00	50	4·00	9·50	15·00	7 0 0	W. Elsworth, corner of York and Joseph-streets, Ballarat East
Bone Fertilizer ..	Horse Shoe ..	..	3·50	..	4·70	10·70	15·40	7 0 0	Patrick Fitzgerald and Sons, Warragul-road, Bentleigh
,, ,, ..	Not Magic ..	..	2·00	..	2·00	15·00	17·00	6 15 0	George Gardiner and Co. Pty. Ltd., Marshall, Geelong
,, ,, ..	No. 2 Magic ..	..	1·50	..	1·50	14·50	16·00	6 7 6	George Gardiner and Co. Pty. Ltd., Marshall, Geelong
,, ,, ..	Samson's ..	..	2·00	..	2·00	15·00	17·00	6 15 0	George Gardiner and Co. Pty. Ltd., Marshall, Geelong
,, ,, ..	Lloyd's ..	..	3·83	..	4·01	7·50	11·51	7 10 0	Edward Lloyd, Tunstall
,, ,, ..	Ark ..	..	3·16	..	3·66	15·60	19·26	7 0 0	Arthur Murphy, Barkly-street, Ararat
Animal Fertilizer ..	A.N.A. Surprise	..	3·00	..	4·00	12·00	16·00	8 10 0	George William Pennell, Braybrook

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1920.—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.	Phosphoric Acid.	Mechanical Condition.		Price asked for the Fertilizer per ton.	Where Obtainable.
				Fine Bone.	Coarse Bone.		
		%	%	%	%	£ s. d.	
Bonedust	Mount Clear ..	3.68	19·95	70·00	30·00	8 0 0	Bailey Bros., Mount Clear, *vid* Ballarat
,, ...	Ox	3·15	22·00	33·00	77·00	7 0 0	Executors of Thos. Brown, Gray-street, Hamilton
,, ...	Vauxhall ..	3.86	23·25	33·70	66·30	8 0 0	William Moore, Panmure
,, ...	White Horse ..	2·50	17·00	60·00	40·00	7 10 0	F. W. Richards, Warrenheip
,, ...	Rohs	4·00	18·00	55·00	45·00	8 10 0	P. Rohs Pty. Ltd., Bendigo Bone Mills, Bendigo East
,, ...	Lion	1·18	30·07	31·00	69·00	7 0 0	Alfred Wray, Raymond-street, Sale
Potash Salt.		Potassium Oxide. %					
Muriate of Potash ..	D. & C. A	52·01	..	..	..	24 10 0	Dalgety and Company Ltd., 461–471 Bourke-street, Melbourne

26th November, 1919.

P. RANKIN SCOTT,
Chemist for Agriculture.

FARM NOTES FOR DECEMBER, 1919.

STATE RESEARCH FARM, WERRIBEE.

By H. C. Wilson, Manager.

Season.

Although the total rainfall for the year has been slightly above the average for the district, its distribution was distinctly unfavorable for the growth of winter crops. A perusal of the following table will show that the bulk of the year's precipitation was recorded outside the growing period, *i.e.*, January, February, and March, late October, November, and December, leaving the six months April to September when crops benefit most with the light total of 6 inches 33 points.

RAINFALL FOR 1919.

Month.	Points.		
January	55		
February	288		
March	536		
April	76		
May	146		
June	119	6·33	14·33
July	134		
August	67		
September	91		
October	140		
November	58		
December	356		
Total	20·66		

A rainfall distribution similar to the above at Werribee must result in light harvests, even on soils that have been well fallowed. The enormous surface evaporation which occurs on the unsheltered plains of this district drains the soil to a very great extent during the growing period of the crop; thus, light showers followed by high winds are of little benefit during the months of April to September, and this year the winter crops suffered greatly in this respect. Though summer and early autumn cultivation of fallows are very necessary to secure moisture storage in the soil, the tilth of the clay lands of this district is badly served by heavy downpours in February and March, as experienced this year, resulting in a baking and setting of the soil which is very difficult to alter or to bring to the necessary good tilth by subsequent heavy cultivations. Places with much lighter total rainfalls, where the bulk of the rain falls evenly during the growing period, always give higher yields than this district.

Harvest.

The weather generally has been favorable for hay harvesting, but the grain harvest which has not yet been completed has been checked by heavy rain and cold squally conditions which prevailed during the last ten days of December.

RESULTS OF THE BULK AREAS HARVESTED.

Area in Acres.	Name of Field.	Variety of Hay.	Total tons.	Average per acre.
				tons cwt.
60	9 N.E. ...	Warden Wheat	75	1 5
110	South Bluegum	Warden Wheat and Algerian Oats ...	148½	1 7
26	North Bluegum	Warden Wheat and Algerian Oats ..	32½	1 5
100	Hackett's ...	Algerian Oats	75	0 15
296			331	

The above table shows a total of 331 tons of hay from 296 acres. This fodder is of the very finest quality, but the average yield per acre is lower than has ever been harvested since the inception of this farm. Shandy hay to the extent of 250 tons has been held over from last season, and this amount brings the total cereal hay on hand to 581 tons.

FIELD No. 9 N.E.

The history of this field since 1913 has been as follows:—

1913	Barley
1914	Bare fallow
1915	Wheat
1916	Rape fallow
1917	Barley
1918	Bare fallow
1919	Wheat

Owing to the presence of wild oats, which were particularly plentiful in the early history of the farm, the land was ploughed in February, 1918, and worked down with the harrows before the seeding time in that year. This allowed a full germination of the wild oats left in the soil, and during the months of June and July the paddock was heavily grazed with sheep. In August of the same year disc cultivation was resorted to, and this work continued whenever signs of wild oats were noticed until April, 1919. This has insured a clean crop of wheat on the field. Seed, 65 lbs., with superphosphate 112 lbs. per acre, was sown in early May; germination was fair, but the plants had not an opportunity owing to the light winter rainfall. The resulting crop was 25 cwt. to the acre.

SOUTH AND NORTH BLUEGUM FIELDS.

The rotation practised on these two fields, which were originally one of 136 acres, has been bare fallow, hay, barley, bare fallow. In 1918 the fallowing was completed in August, and the soil worked down with the harrows immediately prior to harvest. In February of this year two disc cultivations were given, and the seed was sown in late April—40 lbs. of Algerian oats and 40 lbs. warden wheat, with 112 lbs. superphosphate to the acre. The early germination of this field was poor, but a timely fall of rain towards the end of May brought up the remaining oats in the field; fully 50 per cent. of the wheat perished, however, through malting and green mould fungus. The harvest resulted in approximately 1 ton 7 cwt. per acre, and was the heaviest hay crop for the year.

Hackett's Field.

This field was acquired from the Closer Settlement Board in 1916. Late in that year the land was fallowed, and a crop of hay harvested in 1917. In 1918 barley was sown, and immediately the crop was harvested in January and February of the present year the land was ploughed and cultivated and allowed to lie fallowed until late May, 1919, when it was sown with 2 bushels of Algerian oats per acre and 120 lbs. of superphosphate. The winter being particularly dry after the sowing a poor yield was obtained of 15 cwt. per acre.

Summer Crops.

The heavy rains recorded during the past month, viz., 3.58 inches have given a healthy stimulus to the summer fodder crops. Rape sown at the rate of 4 lbs. of seed per acre, with 56 lbs. of superphosphate in September on a 60-acre field, is now very forward, and points to a payable crop being available for the sheep on the farm for the next six weeks. This land which was early fallowed will be heavily disc cultivated during the end of February, and a crop of barley will be sown in late May and June, 1920. In a drought season such as is being experienced at present a summer catch crop of this kind proves a boon to stock-owners, and every endeavour should be made to grow such a crop where at all possible as an insurance against bad seasons.

Lucerne Areas.

Approximately 300 acres of lucerne, 80 acres of which were sown in late October, 1919, are now very well grown. Two cuts of hay have been obtained, the bulk of the established fields averaging 21 to 25 cwt. per acre per cut.

Cultural Operations for December.

1. Hay harvesting with binders, 296 acres and stacking.
2. Harvesting with binders, 100 acres of barley and stacking for thrashing.
3. Harvesting with binders, 50 acres Algerian oats and stacking for thrashing.
4. Cultivating fallows with spike roller and harrows attached, approximately 200 acres.
5. Disc and spring-tooth cultivation of all fallows on experimental areas.
6. Ploughing 30 acres of land near homestead buildings in preparation for early winter forages, which will be irrigated if the season is dry.
7. Harvesting with stripper and combined harvester, 150 acres of wheat in experimental plots.
8. Lucerne hay, harvesting and stacking.

Main Work for the Following Month.

1. Lucerne hay, harvesting and irrigation.
2. Completion of grain harvesting and thrashing.
3. Cultivation of fallows on dry areas.
4. Maintenance of farming routine and improvement work.
5. Attention to stock and dairy herds.
6. Ploughing of 60-acre field for early sown winter rape.

Stock.

Horses.—There are at present on the farm fifty-eight draught horses, eight light horses, and seventeen foals by the Clydesdale stallion "Baron Wigton." The main food for draught stock consists at present in equal proportions of wheaten hay, chaff, and lucerne hay, totalling approximately 36 lbs. per day. The horses generally are looking fit with good coats, and are in hard condition. This is attributed to the balanced character of food rations upon which we are able to feed them.

Dairy Herds.—The total Red Poll and Fresian stock now being milked number fifty; forty-three of which are Red Polls, and seven Fresians; fifteen calves were dropped during the month, nine of which were Red Polls, and six Fresians. The average daily yield of milk produced varied from 130 to 140 gallons, 100 gallons of which are sent daily to the city, 40 being retained for the farm supply and the stud calves. The ration at present for the dairy herd consists of wheaten and oaten chaff silage, approximately 16 lbs. per day, bran 8 lbs. per day, lucerne hay fed in racks in the paddocks at night approximately 14 lbs., lucerne grazing two hours a day.

Sheep.—Considerable reductions in the number of our sheep were made during the last few months of 1919, and at present the total stands at 1,050, consisting of 650 full-mouth Lincoln cross merino ewes, 350 stud Suffolk and Border Leicester flocks, and fifty killers. Early mating of the cross-bred ewes was resorted to this season, and the rams (Border Leicester and Suffolks) have now been finally withdrawn. The stud flocks, however, are to be mated this month. Earlier matings have been tried in years past without success, as these English breeds will not take the ram in this district before the end of January.

Straw Shelter for Stock, State Research Farm, Werribee.

Stock Shelter.

On plain country similar to this district, devoid of natural shelter, either in the form of belts of native timber or protecting hillsides, it is necessary for the health and condition of stock that by some artificial means shelter be provided in the form of either plantations, windbreaks, or covered sheds. A simple straw and native timber shed as illustrated may be constructed cheaply. The dimensions of this shed, which has been erected on one of the open paddocks of the farm, are 32 feet by 106 feet, height to the eaves 8 feet, with a ridge cap 15 feet from the ground. The principal posts are distributed along both open faces of the shed 8 feet apart. These posts should be at least 4 inches in diameter at the small end, and 11 ft. 6 in. long, of which 2 ft. 6 in. is below ground. Tarring or charring is necessary before erection of the portion of the principal posts below ground. The centre principals should, if possible, be 17 feet, and placed 16 feet apart in pairs to support the baled straw which runs through the building, and also as

End View of Shelter Shed Illustrated on Opposite Page.

the main roof support for the centre of the shed. Rough sawn or bush timber rafters 5 inches by 2 inches would suit for supporting ridge cap. The purlins may be rough bush timber fairly straight, placed 1 ft. 9 in. apart at right angles to the rafters through the roof, or, as in the case of the illustration shown, No. 8 wire. The roof should be thatched heavily with wheaten straw cut with a binder after stripping —a thatch that will last for perhaps fifteen years if put on securely and wired with fine wire. The position of the building should of course be such as will give protection from the prevailing winds of the district in which it is built.

Cost.—The total wages paid for erecting this building were £34 8s. 9d., and the materials, which consisted of wire, straw, bush, and small quantities of sawn timber cost £28 11s. 10d. This then shows a total of £63 0s. 7d. for a building that would cost between £250 and £300 if present-day prices were charged and galvanized iron with sawn timber used.

NOTES ON EXPERIMENTAL PLOTS.

Harvesting Conditions.

Harvest operations are still in progress on the experimental plots. The weather has been mild and pleasant, but very few days were really ideal for stripping, and rain interrupted the work on several occasions. A small engine-functioned stripper, designed on the farm and drawn by a single horse, has been particularly serviceable in handling the smaller plots. The produce from these has been bagged in the chaff so that the grain may be secured from the weather as expeditiously as possible.

The flax (linseed) plots have also been efficiently harvested by the ordinary stripper and the produce bagged for winnowing. The results from these will not be available till a later date. The grain harvested to date is bright, of good quality, and more plump than might have been expected under the seasonal conditions.

Cultural Operations.

The fallow sections in the experimental fields were all cultivated early in the month. The heavy rainfall during December will necessitate a further cultivation of the fallows to renew the soil mulch, and thus conserve the moisture in the soil for the use of the 1920 crops.

GARDEN NOTES.

January should be a busy month in the garden. It may be necessary to water frequently, and after every watering the surface should be well loosened, and stirred with the hoe to keep it moist and cool. More cultivation and less water is a good rule to be observed. The hoe should be used more, and the hose less, in summer; greater benefits will accrue, and the water bill will be considerably reduced. Mulchings with straw, grass, &c., are very useful just now. The mowings from lawns form valuable mulching. Waste tobacco stems are also valuable as a mulch.

Dahlias, chrysanthemums, and other tall-growing, slender herbaceous plants will require support in the way of stakes. They will also need mulching considerably. These plants should receive no check whatever, and should be continued with a regular even growth right through the season. Another desideratum is that soils should be well drained, as plants of all descriptions thrive better in well-drained soils.

A sharp look-out should be kept on these plants for attacks of red spider. If this insect appears, a good spraying of tobacco solution or benzole emulsion should be given.

Constant watch will need to be kept for the various small caterpillars that attack the buds of these plants. Spraying with a weak solution of paris green and lime, or similar insecticide, will be useful. Hand-picking should also be resorted to.

A FIELD OF GIANT KANGAROO RAPE

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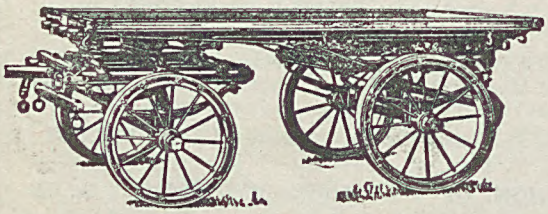

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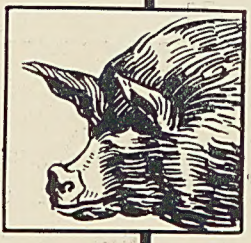

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